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OF

MISCELLANEOUS INFORMATION.

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DVII.—BOTANY OF FORMOSA.

The island of Taiwan—known to Europeans as Formosa—lies 90 miles east from the coast of the Chinese province of Fu-djen. It is about 150 miles from the seaport of Amoy and contains an area of 15,000 square miles and an estimated population of 2,000,000. The back bone of the island is formed of a range of densely wooded mountains containing several peaks, the highest, Mount Morrison, reaching a height of nearly 13,000 feet. A striking feature of the western side of the island is the rapidity with which the land is gaining on the sea. "An old Dutch picture shows Fort Zelandia with richly laden argosies of the Dutch East India Company drawing many feet of water anchored close to the old fort in a position now over a mile from the sea." The climate is humid and tropical. "The mean temperature at sea level is about 75° Fah. for the whole year, about 72° for the seven cool months and about 83° for the remainder." There are two treaty ports, Tamsui and Tainan. Tea was exported in 1893 to the extent of 22,000,000 pounds. Sugar is produced in moderately large quantities, but the quality is inferior. Camphor is rapidily becoming a considerable industry. "Coal is spread almost all over the island."

These facts are taken from a Foreign Office Report on Formosa prepared by Mr. N. Perkins, Assistant in Her Majesty's Consular Service, stationed at Anping (Tainan), in the south of the island (F.O. Commercial No. 1, 1896). Appendix B, attached to this report, supplies a singularly interesting sketch of the flora and economic botany of Formosa, by Mr. Augustine Henry, F.L.S., who is well known for his extensive botanical explorations in various parts of China. As no complete account of the flora of Formosa has yet been published, Mr. Augustine Henry's notes, therefore, possess special value, and by permission of the Secretary of State they are reproduced in the *Kew Bulletin*:—

The materials on which our knowledge of Formosan plants is based all practically lie in the Kew and British Museum herbaria, there being very little in Continental or American institutions. The "*Index Floræ Sinensis*," now being published in parts by the Linnean Society, has utilised these materials to some extent only, for since the appearance of the earlier parts especially large collections have been sent to Kew, which are as yet unworked. No adequate account of the flora

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has been written, nor is it even now possible to do so, for the most interesting half of the island, the mountainous portion, has not been botanized over, except in a meagre way, by native collectors of my own in the southern part, and by one or two Europeans in the north, who have made short excursions from Tamsui. The chief early collectors, Wilford and Oldham, seemed to have touched the coast only at a few points. Swinhoe, who did so much for the fauna, collected a few plants. Tamsui has been visited by Mr. Ford, of Hong Kong, and Mr. Hancock collected most of the ferns in that neighbourhood, but paid little attention to flowering plants. The Rev. W. Campbell some years ago made a collection in the centre of the island, which was, however, unluckily much injured by accidental immersion in a flooded stream while it was being taken coastwise. This collection is now embodied, so far as it was available, in the herbarium of the British Museum. Some three or four years ago Mr. Playfair, while acting as consul at Tainan, made an admirable collection of about 400 species, chiefly from the immediate neighbourhood of Takow, with a few species from Anping and Taiwanfoo. His collection includes, perhaps, a decade of new species and a considerable number of plants hitherto only recorded from the Philippines and from the Indo-Malayan region.

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During 1893 and 1894 I myself have made large collections at Takow, both on Apes Hill and on the plain, and increased Mr. Playfair's 400 Takow species to over 600. Also, following a practice that was a success at Ichang, I employed native collectors, living at distant places, who bring me specimens of everything they see in fruit or flower, and in this way I have obtained a large quantity of material from two districts, one the neighbourhood of Bankimsing, a village situated at the base of the lofty Kalee Mountain, 30 miles east of Takow, the other from South Cape and the surrounding mountains, where, under the guidance of M. Schmüser, one of the lightkeepers, the savage chief "Capting" made a splendid collection.

Both these localities I visited, but was only able to spend a day or two at each. I do not think that anything has been collected by us at a height of over 3000 feet, so that the higher mountains and valleys are as yet virgin soil, and richly tempting to the explorer. Duplicates to over 2000 numbers have been sent by me to Kew, comprising, perhaps, 1000 species in all. Of publications on the flora of Formosa I have mentioned the "*Index Floræ Sinensis*," which is incomplete, as the earlier parts make no reference to Mr. Playfair's collection, and my own collections have not arrived in time to be included in any of the eleven parts published. Mr. Hancock, in the Customs Trade Report on Tamsui for 1881, has drawn attention to the more striking constituents of the flora of the north end of the island, while his account of the agriculture is interesting. I notice he refers to small plots of *Caladium*, by which I dare say he means "taro," a species of *Colocasia*. One meets continually in books of reference on China with this word *Caladium*, which seems to be applied loosely to *Aroideæ* in general, and even to the common "arrowhead" (*Sagittaria*). *Caladium* is a distinctly American genus, and there is no proof that any species of it is cultivated in China, much less that any occurs in a wild state. Mr. Hosie, in his Report on the Island of Formosa, 1893, has treated of the economic botany, but some errors have crept into the botanical nomenclature which I may now set right. The indigo of Formosa is produced by the common papilionaceous shrubs, *Indigofera tinctoria* and *I. Anil*, much cultivated in India and on the mainland of China, where the latter

also occurs wild. *Polygonum tinctorium*, the dyer's knotweed, is cultivated in Manchuria and Japan, but not in Formosa, while *P. orientale* and *P. chinense* are common wild plants in China and Formosa, which do not produce indigo at all. There is no trustworthy evidence, such as specimens of the plants being gathered, available, to enable us to give specific names to the species of banana reported to be made into cloth by the savages in the northern mountains, and to the plant furnishing the rattans exported from Tamsui. The castor-oil plant common, wild in Formosa, is *Ricinus communis*. The sugar-canes cultivated in Formosa comprise two or three varieties of *Saccharum Officinarum*. Too little is known of the flora to enable any speculations on the distribution of the plants met with to be of value, but from the species known to me it is evident that there are many elements in the flora, which I shall now point out.

1. *Endemic Element.*—A good number of species are peculiar to the island. Some of these are very vigorous and abundant, whilst others are met with only in exceptional situations, and are, perhaps, dying out. An exploration of the valleys of savage territory will greatly increase the number of these species, if one can judge from the results obtained by explorations of Central China and Japan.

2. *Flora of the cultivated Plain.*—This is practically the same as that of the Indian plain, and in it I include the littoral flora, which scarcely has a single endemic species.

3. *Plants occurring only in Formosa and the Philippines.*—These occur chiefly, if not altogether, in the south.

4. *Flora, common to Formosa, Japan, and Central China.*—These species occur in the mountains chiefly. Striking examples are the varnish tree (*Rhus vernicifera*), of which no use is made in Formosa, brought to me from the Kalee Mountain; *Idesia polycarpa*, a noble timber tree, discovered by Maximowicz in the mountains of Japan, and since found in mountain forests in Hupeh, and in the same part of Formosa as the last-named tree; *Deutzia scabra*, a shrub with pretty white flowers, common on Apes Hill and throughout Formosa, &c.

5. *Outliers of the Australian Region.*—The best example of this is the very common timber tree (*Acacia Richei*), hitherto only met with elsewhere in Fiji, but I believe it is seen near Amoy, where possibly it may have been introduced by emigrants returning from Formosa. It is the most characteristic Formosan tree, occurring from north to south, in the plain and on the mountains. It belongs to the large section of the genus *Acacia*, in which the trees or shrubs bear phyllodes, or modified leaf stalks, instead of true leaves. These are set on the boughs in the vertical plane, and not in the horizontal, as ordinary leaves are. The wood of this tree—the "sung-ssŭ" of Formosans—is much used for frames of junks, rudders, cross-bars of anchors, beams of houses, &c.

6. *Introduced Plants, now naturalized, and not to be distinguished in habit from true Natives.*—These include a good number of American plants, introduced either intentionally or accompanying seeds of other plants.

I will, however, first mention the cultivated American plants, which are not naturalized, but require man's attention to keep them from dying out:—

Maize (*Zea Mays*), tobacco (*Nicotiana Tabacum*), pine-apple (*Ananas sativus*), sweet sop (*Anona squamosa*), sweet potato (*Ipomœa Batatas*).—This is the species or variety which is cultivated in Formosa, whereas at Ichang it is *Ipomœa fastigiata*, and Mr. Hemsley is of opinion that the latter, which occurs wild in the Andes, is the

parent of the former variety, which is only met with in cultivation. Truly naturalized plants of American origin are:—

Guava (*Psidium Guayava*), everywhere wild in South Formosa, called "Na-pot" by Chinese, chilli (*Capsicum annuum*), tomato (*Lycopersicum esculentum*). The wild form bears small red fruit, not larger than a marble, and it is to be met with far away from European settlements. The tomato is not cultivated by Formosans.

Jatropha Curcas, an euphorbiaceous tree, of small stature, bearing capsules containing three seeds, which yield an oil on pressure. This tree is littoral in habit, and, while known as "T'ung Yu-shu," a name more properly given to the wood-oil tree (*Aleurites cordata*), does not seem to be utilized here. In Canton province the oil is used for lighting purposes.

Pachyrhizus angulatus, a large climbing papilionaceous shrub, with handsome purple flowers in autumn. The root is shaped like a turnip, and is much cultivated in Kwangtung, where it is known as "fan ko" (*i.e.*, foreign "ko").* It is only slightly cultivated in Formosa, but in the wild established state it is common enough.

Pithecolobium dulce, the chin kuei, or golden beetle tree, occurs at T'aiwanfoo.

Hyptis suaveolens, a herb with blue flowers, everywhere amidst grass in the hills, is highly scented.

Hyptis capitata, another herb, liking moist places, with white flowers in a head, is naturalized in Formosa, but, unlike the last species, it has not been met with on the mainland.

The castor-oil plant (*Ricinus communis*) and *Euphorbia Tirucalli* are supposed to be African in origin. Both are quite established. The last is a practically leafless shrub, with dark green boughs filled with an acrid milky juice. Its mode of propagation is puzzling. So far as I have seen the majority of the shrubs bear flowers, which are always female, and do not come to fruit. I have never seen fruit or staminate flowers, and I believe such are unknown in herbaria. Branches, then, with staminate flowers, or with fruit, lopped off and put into spirits by any lucky observer, should be sent to Kew.

A comparison of the floras of Takow and Hong Kong, both in much the same latitude, and only separated by some 300 miles of shallow sea, brings out a striking unlikeness. I may adduce a single instance. Two mangroves occur on the shores of the Takow lagoon—*Rhizophora mucronata*, the common mangrove, and *Brugiera cylindrica*; the first has yellow, the latter red flowers. These do not occur in Hong Kong, but are replaced by two species belonging to quite different genera. If we compare with Hong Kong, and its peak of 1600 feet elevation, an equal area about Takow, including Apes Hill, of 1100 feet elevation, it will be found that the latter area has only about half as many species, while endemic species are much more numerous in Hong Kong.

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The plants met with on the sea shore, and not occurring inland, are (about Takow) the following:—

The mangroves and *Jatropha Curcas*. *Avicennia officinalis* is sometimes called the white mangrove, from the colour of the bark. It occurs

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* The native "ko," also a large woody climber with papilionaceous purple flowers, is common wild in China, Japan, and Formosa. It is *Pueraria thunbergiana*. From the root, which, chipped, is used as a drug, a kind of arrowroot is produced, while the fibre of the stems is made into cloth, especially at Kiukiang, in Corea, &c.; but the plant, which occurs in the Formosan mountains, is not utilized here in any way.

in the swamps, belongs to *Verbenaceæ*, and has yellow flowers and curious fleshy fruit.

Excæcaria Agallocha, known as the "hsiang shu" (fragrant tree). It occurs on the shores of the lagoon. In old trees the wood of the trunk near the ground often becomes transformed in part, changing in colour from white to reddish black. These bits of probably diseased wood burn readily, with a slight odour, and are used locally as a substitute for the true *Garoo* wood, which occurs in Hainan, and is supposed to be the product of a different tree, *Aquilaria Agallocha* or *A. malaccensis*.

Pongamia glabra, a leguminous tree on Takow spit.

Terminalia Catappa, a tree with large oval leaves, occurring in the same locality.

Tournefortia sarmentosa, a common climber, with white cymose flowers and white fruit. An allied species, *T. argentea*, with very thick, velvety, silvery leaves, occurs as a small tree at South Cape.

Ipomœa biloba, a common creeper in the sand, with bifid leaves and bright purple flowers.

Vitex trifolia, common creeper with small blue flowers. I have never seen it but in its unifoliolate variety.

Canavalia obtusifolia, a large climbing papilionaceous shrub, with beautiful red flowers, and large broad thick pods.

Vigna lutea, similar, but with pale yellow smaller flowers, and narrow round pods.

Vinca rosea, periwinkle, is naturalized on Takow spit.

Lumnitzera racemosa, a low shrub with white flowers, occurring in the mangrove swamps.

Euphorbia Atoto, a sea-sand spurge.

Tribulus terrestris, with yellow flowers and spiny fruit, prostrate in sandy places.

Pemphis acidula, a low shrub with white flowers, occurring on wave-washed rocks.

Spinifex squarrosus, a dioecious grass.

A *Sedum* with yellow flowers on sea-side rocks.

Scævola Kœnigii, a shrub.

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The common large trees in the neighbourhood of Takow are :—

Mangifera indica, the mango, wild and cultivated.

Buchanania arborescens, a tree akin to the mango in foliage and inflorescence, but with small inedible fruit, known as the "shan shuai."

Nephelium longana, the lung-an, wild and cultivated. Lung-ans are a staple export.

Ficus retusa is the common banyan tree here.

Ficus wightiana, a less common banyan tree, is readily distinguished by the inflorescence occurring on the leafless part of the boughs.

Ficus beecheyana, occurs as small shrub and tree of 20 feet or more in height; large pubescent leaves.

Ficus leucantatoma, also variable in stature, with large glossy leaves and flattened globular inflorescence.

Broussonetia papyrifera, the paper mulberry, not utilized in Formosa.

Erythrina indica, a thorny tree, with large trifoliolate leaves and magnificent red papilionaceous flowers, known as the "tz'u t'ung."

Macaranga Tanarius, with large peltate leaves, known as the "hsieh t'ung."

Bischofia javanica, with trifoliolate leaves, known as the "ka-tang" (in the local dialect). The wood is good, and used for making furniture.

Melia Azedarach, the pride of India, "k'u-lien."

Neither the common loquat nor the rare Hong Kong species occurs in Formosa, but a very large, and perhaps new, species of *Eriobotrya* occurs near Takow and at the South Cape. The fruit is smaller than the mainland loquat, and has little flavour.

An ash (*Fraxinus* sp.) occurs rarely about Apes Hill, but it is common in the mountains.

The wood-oil tree (*Aleurites cordata*) was found by Mr. Playfair on Apes Hill, but it is very rare, and no commercial use is made of its product in Formosa.

Cordia Myxa produces a viscid fruit, eaten by the natives with soy and garlic, and named "p'o-tzu."

The vegetable tallow tree, *Sapium sebiferum*.—The fruit is not utilized in Formosa.

Sapindus Mukorossi, common on the cliffs as a shrub, is occasionally seen as a large tree. The fruits are not so much used here in lieu of soap, as they are in many places on the mainland.

Bombax malabaricum, the silk cotton or "moc-main" tree, known to the natives as "pun-chi," is a thorny tree with red tulip-like flowers and large capsules, containing the silk-cotton. It is not collected in Formosa.

Amongst smaller trees worthy of notice are the following:—

Laportea pterostigma, a tree of the nettle family, with large leaves which sting violently.

Ehretia formosana, the "houk'o" or "thick bark" has hard wood, which, however, splits on drying. *E. macrophylla* and *E. acuminata* also occur.

Pittosporum sp. nov. the "kiehjiu," is very common, and has hard wood.

Mallotus cochinchinensis, *M. Playfairii*, and *M. philippinensis* are small trees or shrubs, while *M. repandus* has a somewhat climbing habit.

Hibiscus tiliaceus grows to be a fair-sized tree. Its bright sulphur-yellow flowers change as the day advances to a dark maroon colour.

H. mutabilis, smaller, has white flowers changing to pink towards evening.

Murraya exotica, the "shih-ling," is a small tree with fragrant white flowers, easily seen to belong to the orange family.

Leea sambucina, a beautiful shrub or small tree, with large much-divided compound leaves and a mass of red inflorescence, the individual flowers as they open being pale yellow. This tree belongs to the vine family, from which it differs so markedly in habit.

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Caesalpinia, which is wrongly styled "acacia" by some Europeans in China, is represented by three species:—

C. pulcherrima, an erect shrub with gaudy red flowers, much cultivated. I have seen no wild specimens.

C. Nuga, a large thorny climbing shrub, with masses of bright yellow flowers and smooth short broad pods.

C. Bonducella, also a large thorny climber, with inconspicuous yellow flowers and spiny broad pods.

Two other common leguminous climbers on Apes Hill are:—

Millettia reticulata, with purple flowers.

Bauhinia Championi, readily distinguished by the characteristic bifid leaf of the genus and long racemes of white flowers in September.

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Ginger (*Zingiber officinale*) and turmeric (*Curcuma longa*) are cultivated, the latter being a large export from Anping. *Canna indica* is a common cultivated flower. Two species of wild *Zingiber* occur in the Bankimsing Mountains, and a very conspicuous *Alpinia* with beautiful flowers is everywhere common. It is *A. nutans*. Mats are occasionally made of the leaves.

A tall and graceful plant with white flowers in July occurs on Apes Hill and in the bamboo groves on the plain. It is *Costus speciosus*.

The *Arum* family is doubtless well represented in the mountains, but satisfactory specimens for the herbarium are difficult to prepare, and so my native collectors have shirked them. Mr. Morse sent me an *Arisaema* from Tamsui. On Apes Hill and at the South Cape *Alocasia macrorhiza*, with large white flowers and leaves sometimes 3 feet in breadth, is common, and has been carried into cultivation as an ornament of European houses on the mainland.

A new species of *Amorphophallus* is met with on Apes Hill, distinguished by its tuber, like a large potato, which puts forth a single flowering stalk, expanded above into a hollow organ, covered with bristles, dull red or purple in colour, and a gruesome sight. In the following year the tuber sends up a stem bearing three much-divided leaves. A still larger species of this genus, with a tuber 8 or 9 inches in diameter, occurs in the Kalee Mountains. An enormous climber ascending to the summits of the loftiest trees occurs in the mountains, both in the south and at Tamsui, and there are two or three examples of it near the Laiwee village close to Takow. This is *Epipremnum mirabile*, the Tonga plant, with large leaves indented and loopholed. This plant is said to be a specific for neuralgia.

Pothos Seemanni is a common climber on cliff walls.

The most common palm is *Phoenix humilis*, which occasionally attains 10 feet in height. It bears small edible fruit of the same flavour as the date. It is known here as "kuang lang," the name in Kuangtung Province of the tall palm, *Caryota ochlandra*, which produces the coir of South China. A very graceful species of *Arenga* or "sago palm" (*A. Engleri*) is common at Tamsui and on Apes Hill, Takow, and is widely spread in the mountains. It has been introduced into the Hong Kong Botanic Garden by Mr. Ford. It bears a small quantity of coir, and is therefore styled "tsung" by Formosans, which is the name given in Central China to *Trachycarpus excelsa*, generally known as "Chamaerops," the palm which produces the coir of Central China. The *Areca* palm is cultivated on the plain, and I have specimens of a species of *Trachycarpus* from savage territory.

Around Takow there are two species of bamboo very common, the "chi tik" or thorny bamboo, much used for fences, and the "lik tik," which has broad leaves. This occurs wild, and is also much planted for its excellent bamboo shoots. I have obtained flowering specimens of the latter, so that it can be identified, but have failed to obtain flowering specimens of the former, and also of the very large bamboo, "mao-chu" (hairy bamboo), which is used in making the sea-going catamarans. Specimens of bamboos showing both foliage and inflorescence are very valuable, and the special attention of travellers is directed to obtaining and sending them to Kew for identification. Most bamboos only flower when they have attained a mature age, flower once

only and die. Two species of reed are common. *Ischæmum angustifolium* occurs on the sea-face of Apes Hill, and is a grass peculiar in the fluffy nature of the base, out of which the culms spring. It is the "Bhabur grass" of India, where it is used as a good material for making paper.

The sugar-cane, *Saccharum Officinarum*, is much cultivated, and at least three varieties occur, only one of which I have been able to obtain in flower. The cereals include rice, of which five varieties of the common kind are noticed in the Paris Exhibition catalogue. In addition, glutinous rice occurs, and two peculiar kinds, red rice and black rice, which I have not been able to investigate. The black rice is very dear, being used as a medicine, made into an infusion like tea. Wheat is cultivated as far south as the South Cape. Barley occurs in the centre of the island. Maize, common sorghum (*Sorghum vulgare*), and some kinds of millet (*Setaria*) are met with, but to no great extent. Job's tears (*Coix Lacryma-Jobi*), which is always erroneously styled "pearl barley" by Europeans in China, also occurs. It may be noted that *Sorghum saccharatum*, which is cultivated in the Yangtzu Valley, is *not* used by the Chinese for making sugar. This plant is now cultivated largely for that purpose in the United States, where it is sometimes known as the "Chinese sugar-cane," a misleading term.

Cyperaceæ are numerous in species. "Kiam ts'ao," *i.e.*, salt grass, occurs in brackish water, and the stems are much used for tying parcels and for making coarse mats. It is a species of *Cyperus*, but it is not the plant out of which the famous Taika mats are made. The latter are exported from Tamsui, and vary in price from two dollars to as much as 70 dollars each. They are used by the Chinese for sleeping on in summer, and occur in sizes suitable for that purpose. The dearest kinds are fine, even in texture, and with patterns, and can be rolled up into small compass; and one costing 70 dollars, such as might be made for the governor or the palace, may take three years in making. The plant is reported to occur only in cultivation, and to be confined to the neighbourhood of Taika, on the north-west coast. I have been informed that it is sown from seed, and lasts for several years, being cut down thrice a year. The fields are said to be kept irrigated with fresh water like rice fields. I am unaware that any foreigner has observed the mode of cultivation of the plant or the manufacture of the mats; the plant is unknown. There is here room for an interesting investigation, and I suggest that specimens of the plant in flower, with seed for sowing and details of cultivation and manufacture, be sent to Kew by the first traveller in the locality. The naming of *Cyperaceæ*, to which order the plant probably belongs, is difficult, and can only be done satisfactorily at some such establishment as Kew, where there are copious specimens to compare with. I may here mention that the naming of a new plant or the selection out of two or more names of the correct one in the case of a known plant is subject to definite rules, the chief of which is, that a name to be valid must have been accompanied at the time of bestowal with a sufficient description of the plant. When two or more such names happen to be given independently, then the prior name is the correct one, the spelling of the first name must be rigidly adhered to, and if descriptive in character it cannot be altered even when erroneous. We are not then at liberty, *e.g.*, to alter *chinensis* to *sinensis*, or *vice versâ*; and we cannot change *japonica*, even if, as is the case with some plants so called, the plant is not really a native of Japan.

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Economic Botany.

Some of the plants useful to man or cultivated in Formosa have been incidentally mentioned in the preceding sketch; but I shall now confine myself in the remaining part of this paper to plants of economic importance.

The edible *Leguminosæ* are the same as on the mainland. The garden pea (*Pisum sativum*), the Soja bean (*Soja hispida*), *Lablab vulgaris*, and several species of *Phaseolus*. The two following members of the order are worthy of note:—

Sesbania aegyptiaca, known as "shan ch'ing" (*i.e.*, wild indigo), is a slender shrub with yellow flowers and very long slender pods. It is planted chiefly as a help to the soil, being ploughed in when the stems are a foot or so high. Left to grow, it attains 5 or 6 feet, and is only useful as fuel.

Cajanus indicus, a tall shrub, known as the "shu-dou" (tree-bean), is cultivated for the seeds, which are ground into flour and used for making cakes. The Fukien name of this plant is "hiang dou."

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The following oil-producing trees and shrubs, but which are not utilized in Formosa, have been incidentally mentioned:—*Jatropha Curcas*, *Aleurites cordata*, *Ricinus communis*; and to this class may be added the varnish tree and vegetable tallow tree. Paper might be made out of *Broussonetia papyrifera*, and also out of a species of *Wikstræmia*, which is common in Formosa, but unutilized; paper from it is a Pakhoi export. One of the most interesting Formosan products is the pith of *Fatsia papyrifera*, commonly known to Europeans as the "rice paper" plant. I can add nothing here to what is already known on the subject, but may mention that the plant also occurs in Ssü-ch'uan, and there is a considerable export of "pith" from Ichang and Hankow. I did not see the plant wild in Hupeh or Ssü-ch'uan.

Ordinary or laurel camphor I leave unnoticed, as I have not been to the districts of production.

A peculiar kind of camphor, of great value in the eyes of the Chinese, is distilled in Hainan from the leaves of *Blumea balsamifera*, a shrubby plant about 2 or 3 feet in height, belonging to *Compositæ*. This may be distinguished as "Ai" camphor, from the Chinese name of the product:—Ai-fen, the crude state; Ai-p'ien, the purified form. The plant does not occur on the Chinese mainland, but is common enough in India, Burmah, and Formosa. The Rev. W. Gilman, of the American Mission at Kiungchow, has sent me an account of the Hainan method of distillation, which I hope to see soon in the *Kew Bulletin*.* This plant is worthy of attention from a commercial point of view.

There are three chief fibre-yielding plants in cultivation:—

1. *Boehmeria nivea*, known locally as "t'oë," the "ch'o" of Pekingese, the nettle-hemp, yielding China grass fibre. Lately in the customs returns for Tainan it has been distinguished by the last name, but formerly it had here (and in other ports still has) only the general name "hemp," which in China includes several different fibres. Formosan "rhea fibre" is worth from 11 dollars to 20 dollars a picul (133⅓ lbs.), and is made into a particular kind of grass-cloth at Swatow.

2. Pineapple, the fibre of which in the local dialect is known as "ong-lai-ssü," and is worth about 24 dollars a picul. It is exported to

* *See Kew Bulletin*, 1895, p. 275 (with plate).

Swatow, where it is made into the kind of grass-cloth distinguished as "ong-lai-ko."

3. Jute (*Corchorus capsularis*), the fibre of which is known to Europeans in China as "hemp skin," a too literal translation of the Chinese "ma-p'i." "Ma" is generic for textile fibres, "p'i" is "bark," referring to the outer bark of the plant, which is stripped off in long ribbons. Owing to the different preparation of the plant in China and in India the products look very different. The so-called "hemp bags" of customs returns are made out of this coarse Chinese jute, which is also used for making rope and string of inferior quality. The jute is worth from 2 to 4 dollars a picul.

Corchorus olitorius, an allied species, which is readily distinguished by its long narrow fruit, that of *C. capsularis* being globular, occurs in Formosa as a weed, and I have not ascertained that its fibre is ever used.

It may be here noted that the so-called Tien-tsin jute is the product of *Abutilon Avicennæ*, and should be named "Abutilon hemp." I have seen true or Russian hemp, the product of *Cannabis sativa*, the "huo-ma" of the Chinese, from Newchwang, but this plant is more cultivated in China for the oil from the seeds than for the fibre; and of flax (*Linum usitatissimum*), which is cultivated in North-western China, the same may be said. Occasionally small quantities of a fabric named "shan-hsi ma pu," are brought to Tien-tsin, and this is doubtless linen, but I have seen no specimen, and merely infer from the name. The fabric has been described to me as a kind of grass cloth.

Flax is "hu-ma," and the seeds are for sale in drug shops.

"Savage cloth" is a term applied to at least three different kinds of coarse unbleached fabrics made by the savages. The kind made near Tamsui is of China grass, but whether from wild or cultivated plants of *Boehmeria nivea* I am not certain. The wild plant is very common, and has a coarser fibre. In the Kalee Mountains "savage cloth" is made out of the inner bark of the roots of small wild mulberry trees, doubtless a variety of the very variable *Morus alba*. I have sent specimens of plant, root, fibre, and cloth to the Kew Museum. Game-bags ("bang-teh"), very serviceable, are also made out of this fibre by the savages, while similar ones are made out of China grass by the Chinese and Pepohuan. A third kind of "savage cloth" is made from the inner bark of *Sterculia platanifolia*, known in Formosa as the "ch'ing-t'ung" tree. I have not been able to get specimens of either fibre or cloth in Formosa, but specimens of fibre, and shoes made out of it, from Hupeh, have been sent by me to Kew. This tree has been utilized for its fibre from classical times, but the product is coarse, and only suitable for making shoes, ropes, &c.

Mr. Hosie mentions a fourth kind of "savage cloth," made out of banana fibre, but there is no certain information to hand about this.

"Dye yam," the large and dark red tuber of *Dioscorea rhipogonoides*, Oliver, a wild yam occurring in the southern mountains of Formosa. These tubers are locally used by the fishermen for dyeing and tanning their nets reddish brown; occasionally also their clothes are dyed similarly. The tubers are cut up into small pieces and put into large vats of water placed on a fire; the resulting red decoction is the dyeing liquid. The plant occurs in Hong Kong, and was first collected by Mr. Ford, who afterwards, on his trip up the West River, ascertained that the tubers so much used in the Kwang Tung Province were the product of this plant. It occurs also wild in Kwang-hsi and Tonquin, and enormous quantities are sent from the French colony into China by

way of Lungchow. The French call the tubers *faux Gambier*, but they are generally known in customs returns as "dye root," or "dye yam," "shu-lang" being the Chinese name. In addition to their use for dyeing nets, the Cantonese employ them for giving a peculiar gloss to certain cotton goods. Specimens have been sent to Kew and to the Pharmaceutical Museum, and if found to be of value in Europe as a dyeing or tanning material, doubtless large quantities could be exported from South Formosa, where the present price is about 2 dollars a picul. (*Kew Bulletin*, 1895, p. 230.)

"Ok-gue," the dried fruit of *Ficus pumila*, a common shrub, climbing over rocks; yields a peculiar jelly when treated with water, and is a common article of consumption amongst the Chinese in summer. It might be of value in the home market.

Very curious fans are made in Taiwanfoo out of the leaf of the "Areca" palm, which is planted considerably in South Formosa.

In the preceding notes I have not touched on many well-known local products, as ground nuts (*Arachis hypogaea*) and sesamum seed, both of which are considerable sources of oil.

Formosa is rich in fruits, of which pine-apples and "lung-ans" are the chief from a commercial point of view. Oranges, pumeloes, carambolas, pears, rose-apples, guavas, papaws, cocoanuts, sweet sops, bananas, &c., are also produced in quantity.

Tamsui exports certain kinds of seaweed (identified at Kew as *Suhria prestoides*, J. Ag. and *Gelidium Amansii*, Lamx.), tea, rattans (from an undetermined species of *Calamus*), tobacco.

"Medicines" is generally an interesting heading amongst exports from a Chinese port, but scarcely any, if one excludes camphor and turmeric, are exported from Tamsui or Tainan. "Sang-bai-p'i," the bark of the mulberry, and "mu-hu," a species of *Dendrobium*, occasionally are sent from Formosa.

"Capoor cutchery" and ginger are cultivated for local use, and in the Kalee Mountains a species of *Cinnamomum* occurs, different from *C. Cassia*, which the natives use in lieu of the true cassia bark.

Timber, when the mountainous country inhabited by the savages is opened up, will doubtless be an important article. I have already mentioned the common trees of the plain, most of which occur in larger size and greater number in the mountains, and I will now make a note of a few of the timber trees, which practically only occur in the mountain forests, reserving for a future occasion a discussion on the great number which have been collected by my natives. Very few species of conifers are known as yet from the island, but doubtless when higher altitudes than 3000 feet have been explored, more kinds will be found, if one can judge from the mountains of Japan and Central China.

Podocarpus Nageia, furnishing an excellent wood, has been sent me from Tamsui by Mr. Morse. The Chinese call it "shan-sha." An allied species occurs at the South Cape. Mr. Morse also sent me *Cunninghamia sinensis*, the "sha" tree of the mainland, so much used for making tea chests; but I am not certain that the specimen was indigenous. This tree is common in the mountains of South and Central China, and is often dubbed *Araucaria* by the non-botanical traveller. *Thuja orientalis* also occurs.

Oaks are abundant in species in the southern mountains. They all yield hard wood, and all have persistent leaves, and are possibly new species. At Tamsui an *Alnus* occurs; and at Takow, on the creek banks, a *Salix* is common.

Lauraceæ are numerous in species in the mountains; there are several species of *Machilus* with excellent wood. One of the local, "lam-a" wood ("nan mu" of Mandarin speech) is much used for making furniture, &c. The "siao lam" is another species. Camphor wood, of course, is common and excellent. *Ebenaceæ* are abundant. *Diospyros Kaki*, "the persimmon," is cultivated for its fruit. Another species occurs as a small tree on Apes Hill, while at the South Cape a third species, with large hairy fruit, is common; but the source of the ebony ("o-ma-ts'a"), which is highly valuable, and common in the southern mountains, is not yet satisfactorily made out.

Maples are scarce, perhaps three or four species in all. *Styrax*, *Symplocos*, *Eugenia*, and *Calophyllum*, and numerous other genera with excellent wood are well represented in the mountains.

DVIII.—NEW RUBBER INDUSTRY IN LAGOS— (continued).

(*Kickxia africana*, Benth.)

The rubber industry at Lagos of which an account was given in the *Kew Bulletin*, 1895, pp. 241–247 (with a plate), affords one of the most remarkable instances of the rapid development of an industry that has taken place in recent years in any British Colony. It owes its existence to a wild plant which was only discovered in Lagos within the last two or three years. It was found to be new as a source of rubber, although there is now reason to believe it had yielded some of that formerly exported from the Gold Coast. At the present time *Kickxia* rubber from Lagos has established itself as a commercial article in great demand. The exports in January 1895 were 21,131 lbs. of the value of 121*l*. This was practically the beginning of the industry. In December 1895 the exports had increased to 948,000 lbs. of the value of 51,488*l*. 9*s*. 4*d*. From a recent return, communicated to Kew by the Government of Lagos, the total exports during the year 1895 amounted to 5,069,504 lbs. (2263 tons) of the value of 269,892*l*. 13*s*. 10*d*. This considerable industry has therefore been called into existence within 12 months. The rubber is purely a forest product, and the collection and preparation of it have been effected by means of native labour. The success of the industry is another indication of the undeveloped resources of our West African Colonies. It is only a few years ago that a somewhat similar though more gradual, rubber industry was called into existence at the Gold Coast. The origin of this is given in the following extract from a Colonial Office Report on the Economic Agriculture of the Gold Coast in 1889 (C. O., 110, 1890): "Although the youngest of our industries, the preparation of india-rubber is now only second in importance to that of palm-oil. Attention was first drawn to this valuable product by Sir Alfred Moloney (now Governor of Lagos) when administering the government of the Gold Coast Colony in 1882, by letters to the local press. The first practical experiments were made by Mr. F. C. Grant, of Cape Coast, whose example was quickly followed by others, and the undertaking proving remunerative, the collection of rubber began in every part of the colony. The quantity now produced annually ranges from 30,000*l*. to 40,000*l*. in value."

During the year 1893 the Gold Coast exported rubber to the extent of 3,395,990 lbs., and of the value of 218,162*l*.

The following details respecting the exports of Lagos rubber have been received from the Government of the Colony:—

Colonial Secretary's Office, Lagos,
January 13, 1896.

DEAR THISELTON-DYER,

I ENCLOSE a return showing the export of rubber during 1895. Tremendous, is it not? It seems to be the general opinion that there will be a considerable falling off this year, but I question if anyone can speak with any degree of certainty on this point.

We have had a good year on the whole; revenue, 142,000*l.*, the largest on record.

Believe me, &c.,
(Signed) GEORGE C. DENTON.

EXPORT of RUBBER from the Colony of LAGOS from 1st January to 31st December 1895.

Month.	Weight in lbs.	Value.		
		£	*s.*	*d.*
January	21,131	1213	10	3
February	15,888	777	0	11
March	26,316	1419	7	8
April	39,763	2078	16	6
May	216,916	11,700	0	7
June	268,619	12,577	2	6
July	461,765	22,593	13	3
August	354,990	19,951	18	3
September	673,160	36,172	19	9
October	1,059,158	57,117	1	10
November	983,394	52,802	13	0
December	948,404	51,488	9	4
Total	5,069,504	269,892	13	10

E. A. LOVELL, Collector of Customs.

DIX.—COFFEE PLANTING IN LAGOS.

Coffee planting is being energetically extended in West Africa. This part of the world is the home of more than one species yielding commercial coffee. Chief amongst these is the Liberian coffee which thrives at sea level. This has long been grown in the native state of Liberia.

Seeds of Liberian coffee were received at Kew in 1872 from a small plantation on the Secocm River near Accra on the Gold Coast. "The plants raised from these seeds at Kew were the first grown in this country. In 1874 and 1876 larger supplies of seed were obtained direct from Liberia, through the kind agency of Mr. James Irvine, of the firm of James Irvine & Co., of Liverpool. The plants were distributed from Kew to tropical botanical gardens throughout the Empire."—(*Kew Bulletin*, 1890, pp. 245–253.) Coffee cultivation is now being carried on under European supervision both at the Gold

Coast and at Lagos. In the latter colony the industry has originated in the efforts made in that direction at the botanical station established by the Government at Ebute Metta.—(*Kew Bulletin*, 1888, p. 149). The distribution of Liberian coffee and other plants from this station have been as high as 13,960 per quarter, or at the rate of 45,000 per annum. In 1892 (although a nominal price only was charged for the plants and in some cases many distributed free of charge to native chiefs) the total receipts amounted to more than 91*l*. What was apparently the first attempt at a regular coffee plantation in Lagos is described in the *Kew Bulletin*, 1893, p. 182.

In 1894 some Arabian coffee in parchment, grown at the botanic station at an elevation of only 20 feet above the sea, was valued in London at 94*s*. per cwt. It has been shown, however, that the more permanent sort to grow in the lowlands is the Liberian coffee, and samples of this were recently valued at nearly the same price. The curator, Mr. Millen, remarks in his Report for the quarter ending the 31st December 1894:—"There is no doubt that coffee has a great future before it on the West Coast. If properly cultivated and prepared it should be able to compete with any coffee-growing country."

In the Appendix to the Report on the botanic station for the quarter ended 30th September 1895 the following further particulars are furnished respecting the extension of coffee plantations in the colony of Lagos:—

It will probably be interesting to record the advancement made in *Coffee* plantations in this colony, which have originated through the establishment of this botanical station.

When returning from Abeokuta his Excellency the Acting-Governor gave me permission to visit two plantations situated near the Ado River.

The first one I visited was at Soto, and is owned by the Ilaro Estates and Plantations Company, Limited; it was commenced in 1892, and is under the management of Mr. Punch, a European, who took me round and kindly gave me quarters for the night.

Mr. Punch calculates that he has 150 acres under cultivation, which includes 50,000 plants of *Coffea liberica*. These plants are in different stages of growth, 1200 plants are three years old, and are producing a fine crop of large bold berries; 5000 trees are two years old, and are in a very healthy and flourishing condition. These also are producing berries, and are doing remarkably well when taking into consideration that a crop is not expected much before three years; 9000 plants were planted out last year, and 36,000 during the present year.

About 1000 of *Coffea arabica* are planted out, and these have produced good crops of berries of good size.

Cacao is also being grown; 4500 plants have been planted out, and their appearance is everything that could be desired for young plants.

Rubber-trees.—Ceara rubber (*Manihot Glaziovii*) are also being cultivated; 700 trees have been planted out, and are doing exceedingly well; a few plants of *Ficus elastica* have made considerable growth.

Fruits.—Pine apples, the cultivated forms of this fruit are grown to a small extent, and produce fruit of good size and flavour.

The work of the plantation is being carried out systematically; good roads cut, shelter belts left, and planting and hoeing being attended to and carried out properly. The ground is kept free from weeds as much as possible.

Nurseries.—Seedling plants of coffee in beds number about 10,000; large nurseries are being made ready for the reception of seeds for

supplying plants to further extend the plantations. Mr. Punch hopes to raise in all about 50,000 plants.

The plantations are worked at the present time by about 70 Kroo and native labourers.

Judging from the healthy appearance of the plants, and their development since they have been planted out, the soil must be everything that could be desired, and well suited to the cultivation of coffee and other plants.

The work is very creditable to Mr. Punch, who takes great interest in it. He was pleased to see me to obtain information on many points.

I next visited the plantations, the property of A. C. Campbell & Co., situated on the other side of the river, and about one hour distant from the town of Ajilete. I visited this plantation in the early part of 1893, and reported on it. At that time preparations were being made for planting out during the rains. I could see a marked improvement since my first visit, and considerable work had been done.

Mr. Campbell offered me every facility, and was pleased to see me visiting the plantation. He states that he has 160 acres under cultivation, most of these being planted with Liberian Coffee, numbering 67,000 plants. They are represented in three stages of growth :— 13,000 were planted out in 1893, and are in a most flourishing condition ; the berries are well matured, and of good size. In 1894, 22,000 were planted out and are doing well ; while 32,000 have been planted in their permanent place during the present year. The plants are looking very satisfactory for the time of year.

Here, also, are a few plants of *Coffea arabica*. They have done so well that Mr. Campbell intends to extend the plantation and plant more of this kind.

Nurseries.—About 25,000 plants of *Coffea liberica* are in beds large enough to transplant.

Vanilla (*Vanilla planifolia*).—These were obtained from the Botanic Station, and grown in a shady and cool place on the plantation. Here they have made enormous growth, and have been doing so well that Mr. Campbell anticipates planting out an acre with this valuable plant.

Kola (*Cola acuminata*).—About 600 of these have been planted under the shade of forest trees.

Cacao.—About 300 plants of cacao have also been planted out, to ascertain their suitability for further cultivation.

The plantation is kept in a clean condition, free from weeds ; the soil is rich in vegetable matter ; it is pure forest land, and several streams pass through the plantation, which are very useful in watering the nurseries.

The work has progressed considerably since my previous visit, and the work carried out by Mr. Campbell is very creditable indeed. This plantation is worked by 45 labourers.

Insects.—To a small extent these exist on both plantations. The borer is the most destructive, but there are very few plants attacked by it. On its first appearance it should be at once got rid of. Mealy bug and scale attack some of the trees, and a peculiar caterpillar at a certain season of the year devours the leaves.

H. Millen, Curator,
Botanic Station.

DX.—BOTANICAL ENTERPRISE IN EAST AFRICA.

As pointed out in the *Kew Bulletin* for 1893, p. 363, numerous notices have appeared in these pages recording the attempts made by means of the Botanic Station system to develop the material progress of the West African colonies.

So far, however, it has not been formally applied to the British possessions on the East Coast. The transmission of tropical plants suitable for cultivation in those territories is not unattended with difficulty, and a convenient station on the coast, where they could be propagated, and from which they could be drawn, would undoubtedly be of great utility to intending planters both in British East and in British Central Africa.

As regards the latter territory, Mr. Alexander Whyte, acting under the instructions of Sir Henry Johnston, K.C.B., H.M. Commissioner and Consul-General, commenced a small botanical garden in 1891 at Zomba, the head-quarters of the administration. An account of the enterprise is given in the *Kew Bulletin* for 1895 (pp. 186–191). The site is, however, some 400 miles from the coast, and plants transmitted from England can only reach it by the Zambezi. There is every reason, however, to believe that the Shiré Highlands will become the seat of an important planting industry. Coffee was introduced as long ago as 1878. It has been cultivated with great success by the Messrs. Buchanan, and 30 estates "have been opened up." Shiré Highland coffee commands a high price on the London market.

The first attempt to establish a depôt on the East Coast was due to private initiative.

As stated in the *Kew Bulletin*, 1892, p. 87, "during the time Sir John Kirk, G.C.M.G., K.C.B., was Agent and Consul-General at Zanzibar, he maintained at his own expense an experimental garden in which he tried every useful tropical plant likely to be adapted to the climate. These were for the most part supplied from Kew."

Apart from this he took, from his first residence in the country, an enthusiastic interest in the botany of Tropical East Africa, and his collections of specimens of its little-known vegetation are amongst the most important available for the "*Flora of Tropical Africa*" in preparation at Kew.

He was not less interested in promoting industries that have since proved of the utmost value both to the natives and to Europeans in that part of the world.

The utility of work of this kind fortunately does not cease with the removal of the hand that carried it on. The benefits that are still derived from Sir John Kirk's garden in Zanzibar are illustrated by the following passage in Mr. Alexander Whyte's *Report* on Botanical Work in British Central Africa, lately published by the Foreign Office, and already cited in the *Kew Bulletin* (1895, p. 187).

"During the short stay of Mr. Johnston's expedition at Zanzibar in June 1891, Captain Sclater and I visited Sir John Kirk's old garden, a short way out of town, which is now a station of the Universities Mission. Through the kind courtesy of the lady missionaries I procured the seeds of a good many economic and ornamental plants from the garden, such as Liberian coffee, *Casuarina*, cassias, guavas, anonas, passifloras, mango, orange, cucurbitaceous plants, pineapple shoots, &c., and nearly all of them are now doing well at Zomba. I also brought with me a supply of ripe cacao pods from the same garden or plantation, which plant had

been introduced years ago by Sir John Kirk. The seeds from these pods, I regret very much to say, failed to germinate."

A fuller account of the present condition of the garden is contained in the following notes of a recent visit, taken from the *Zanzibar Gazette* of the 28th August 1894:—

"Mr. Crabbe, the Ceylon planter who was passing through here last week on his way to Nyassaland, paid a special visit to Mbweni for the purpose of noting the condition of the coffee plantations started by Sir John Kirk at the close of his time here.

"Mr. Crabbe was well pleased with the condition of many of the trees, and as the crop was ripe and falling, he opened some berries and considered some of the beans quite fine. He made several recommendations, which were duly transmitted to the Rev. J. Key, who takes great interest in the plantation, but who was unfortunately away from home at the time.

"The tea which is now in full blossom and affords a pretty sight well worth a drive to visit, Mr. Crabbe considered a poor kind and for the leaf hardly worth growing, and he did not recommend its extension.

"The cacao he considered planted in too windy a site, but walking about the shamba pointed out many spots on which he thought it could be planted to better advantage."

In the *Zanzibar Gazette* of the 11th September 1895, there is an appreciative review of Sir John Kirk's work in East Africa. His services to botany and horticulture are referred to as follows:—

"Besides these main features of his rule, minor affairs of the island were his constant solicitude. Agriculture, horticulture, experimental planting, the rearing of botanical specimens, all engaged his attention.

"The specimens of imported plants still to be seen in his old shamba at Mbweni, full of interest to the interested visitor who is lucky enough to find them, show how keen was his enthusiasm for the adornment of the place, while his efforts to establish a profitable occupation for the natives in connection with coffee planting, and aloe fibre manufacture may even yet bear fruit. Hardly is there a flower displayed upon a dinner table in Zanzibar which does not owe its introduction into the island to Sir John Kirk; and had he remained here, with all the opportunities the place affords, Zanzibar might now be a floral and arboreal Paradise; as it is, his memory will be kept ever green in this way alone."

In a private letter, dated October 16, 1895, Sir John Kirk wrote:—"My garden at Mbweni is coming at last to be appreciated, and after eighteen years my coffee plantation, which supplied me with coffee when there, is now likely to be the source of an industry to relieve the dependence on the clove which is the danger of the island. My coffees all came from Kew; they are Liberian and do splendidly."

Almost every economic production of East Africa has at one time or another received attention from Sir John Kirk. He virtually created the rubber trade of the east coast. This has attained in some years to a value of over 200,000*l*. The plants yielding the rubber discovered by him are enumerated in the *Kew Report* for 1880 (pp. 39 to 42).

Again, plants of the East African copal, *Trachylobium hornemannianum*, were received from him, as well as specimens of the Bark cloth of Uganda (*Kew Bulletin*, 1892, p. 58); Kew is also indebted to him for

seeds and particulars of two new species of African plantains (*Musa livingstoniana* and *M. proboscidea*), as recorded in the *Kew Bulletin* (1894, p. 225).

A kind of dye-wood (*Cardiogyne africana*, Bur.), probably of economic value, was described by Sir J. Kirk (*Journal of the Linnean Society*, ix., p. 229) as the produce of a new species of *Cudrania*. The edible fruit "has somewhat the flavour of an insipid custard-apple. The tree ranges at least from the Zanzibar coast to British Central Africa, where it is apparently abundant. Bentham and Hooker (*Genera Plantarum*, iii., p. 362) refer it to *Plecospermum*; but now that the fruit is known to consist of free drupelets, it is better, perhaps, to give it generic rank.

Sir John Kirk's services to horticulture at home cover the whole period of his residence in Africa. The following list of plants introduced by him to European gardens, chiefly through Kew, is an interesting record of what is possible to be done by an enthusiastic and devoted traveller:—

PLANTS introduced from EAST TROPICAL AFRICA to KEW by Sir JOHN KIRK.

Aloe brachystachys, Baker, n. s.p. Bot. Mag. t. 7339.
„ *concinna*, Baker, n. sp.
„ *Kirkii*, Baker, n. sp.; Bot. Mag. t. 7386.
„ *penduliflora*, Baker, n. sp.
Chlorophytum Kirkii, Baker, n. sp.; Gard. Chron. 1882, (i.) 103.
Clerodendron cephalanthum, Oliver, n. sp.; Ic. Pl. t. 1557.
Crinum Hildebrandtii, Vatke.; Bot. Mag. t. 6709.
„ *Kirkii*, Baker, n. sp.; Bot. Mag. t. 6512.
Drimiopsis Kirkii, Baker, n. sp.; Bot. Mag. t. 6276.
Encephalartos Hildebrandtii, A. Br.
Hibiscus schizopetalus, Hook. f., n. sp.; Bot. Mag. t. 6524.
Impatiens Sultani, Hook. f., n. sp.; Bot. Mag. t. 6643.
Kæmpferia (*Cienkowskya*), *Kirkii*, n. sp.; Bot. Mag. t. 5994.
Keramanthus Kirkii, Hook. f., n. gen.; Bot. Mag. t. 6271.
Landolphia florida, Benth.; Bot. Mag. t. 6963.
„ *Kirkii*, Dyer, n. sp.
„ *petersiana*, Dyer, n. sp.
„ *Watsoni*, Dyer, n. sp.
Musa livingstoniana, Kirk, n. sp.; Journ. Linn. Soc. ix. 128.
„ *proboscidea*, Oliver, n. sp.; Ic. Pl. t. 1777.
Neobenthamia gracilis, Rolfe, n. gen.; Bot. Mag. t. 7221.
Ochna Kirkii, Oliver, n. sp.
Sansevieria Kirkii, Baker. n. sp.; Bot. Mag. t. 7357.

Every effort has been made by Kew to assist the establishment of planting industries in British Central Africa by the despatch of plants suitable for cultivation there. But owing to the length of time occupied by the transit, the operation is beset with considerable difficulty.

The following letter gives an account of the measure of success which attended the last consignment:—

Mr. J. W. Moir to Royal Gardens, Kew.

Lauderdale,
British Central Africa, *via* Chinde,
My dear Sir, 20th September 1895.

The Wardian case you kindly sent me per s.s. Illovo on 26th June last arrived here yesterday, having been 85 days *en route*. This was full 20 days longer than it should have been, and I have written very strongly to the agent of the African Lakes Company at Chinde, pointing out that while healthy passengers can take care of and speak for themselves, healthy plants want and demand by their inability to shout out for themselves more care and attention.

In spite of the long transit, they are in marvellously good condition. Only four are absolutely dead and non-existent, a hole only remaining to testify visually to their former existence. These are all Musas. Then *Cinnamomum Camphora* and *C. zeylanicum* seem quite dead; while *Dipteryx odorata*, *Eugenia malaccensis*, *Piper longum*, and Tamarind, have only vague signs of life. *Eugenia Jambos*, *Passiflora maliformis*, *Piper Cubeba*, and *P. nigrum* will come round I hope and trust, while all the other 20 are in good condition. This seems a marvellous result after 85 days, a period seldom exceeded, I should think, in these days of rapid transit. Twenty good, four fair, four doubtful, and six dead: excellent!

All the Musas being dead remind me that I have been on the look-out since reading your *Bulletin* on bananas, for seed of our indigenous Musa here But it is difficult to get, and seems to seed very seldom. When I get seed I shall send you some.

As to the material of the panes, which is much better than the old glass, the varnish or oil had melted and a good many leaves had stuck to it and been quite spoilt. It had run down the branches and stems of three or four, and apparently killed them so far. The moment I got off the first side, or front, I put sheets of paper over each pane to prevent this. Perhaps for hot journeys paper or some such impervious covering would be of advantage.

I gave the plants perhaps 10 minutes diffused light in a verandah, about 2 p.m., when they arrived, and over an hour again later in the afternoon. To-day I have taken them into a room, with both slopes off, taking out six or eight that seemed suffering from too much moisture. To-morrow I shall have them put into boxes and carefully turned twice or thrice a day, first in the room, next in the verandah, and lastly in a shady place in the open air. Those that are moribund I shall give a little bottom heat.

Hoping many may eventually prove of much use in the country, and with my sincerest thanks,

I remain, &c.,
(Signed) John W. Moir.

W. T. Thiselton-Dyer, Esq., C.M.G., C.I.E.,
Director, Royal Gardens, Kew.

Before the establishment of the Botanic Garden at Zomba, numerous Wardian cases of plants were sent to the African Lakes Company and

the Livingstonia Mission. The following is a list of plants which have been so despatched during the last ten years:—

Botanical Name.	English Name.	Destination.	Date.
Adenanthera pavonina - -	Red sandal wood -	A.L.C.	1886
Alpinia Galanga - - -	Siamese ginger -	„	„
Anona muricata - - -	Sour sop - -	„	„
„ „ - - -	„ „ - -	L.M.	1894
Bertholletia excelsa - -	Brazil nut - -	A.L.C.	1886
„ „ - -	„ „ - -	L.M.	1894
Bixa Orellana - - -	Arnatto - -	A.L.C.	1886
Camellia Thea - - -	Assam tea - -	„	„
„ „ - - -	„ „ - -	L.M.	1894
Carica candamarcensis - -	- - - -	„	„
Caryophyllus aromaticus - -	Clove - - -	A.L.C.	1886
„ „ - -	„ - -	L.M.	1894
Cedrela odorata - - -	West Indian cedar -	„	„
Chrysophyllum Cainito - -	Star apple - -	„	„
Cinchona ledgeriana -	Cinchona - -	A.L.C.	1886
Cinnamomum Camphora - -	Camphor - -	„	„
„ Cassia - -	Cassia -	„	„
„ „ -	„ - - -	L.M.	1894
„ zeylanicum - -	Cinnamon - -	„	„
Coffea arabica - - -	Arabian coffee -	A.L.C.	1886
„ „ var. - -	Maragogipe „ -	„	„
„ liberica - - -	Liberian „ -	„	„
Cola acuminata - - -	Kola nut - -	L.M.	1894
Cratæva gynandra - -	- - - -	A.L.C.	1886
Cyphomandra betacea - -	Tomato tree -	L.M.	1894
Dipteryx odorata - -	Tonquin bean -	A.L.C.	1886
Epipremnum mirabile - -	Tonga - -	„	„
Erythroxylon Coca - - -	Coca - - -	„	„
„ „ - -	„ - -	L.M.	1894
„ „ - -	„ - - -	A.L.C.	1886
Guiacum officinale - -	Lignum vitæ -	„	„
Gynocardia odorata - -	- - - -	„	„
Hevea spruceana - -	Guiana rubber -	„	„
Inocarpus edulis - - -	- - - -	„	„
Jambosa vulgaris - -	Malay apple -	„	„
Limonia acidissima - -	- - - -	„	„
Manihot Glaziovii - -	Ceara rubber -	„	„
Musa Champa - - -	Plantain - -	L.M.	1894
„ martabanica - -	„ - -	„	„
Nephelium Litchi - - -	Litchi - -	A.L.C.	1886
Passiflora edulis - - -	Sweet cup - -	L.M.	1894
Pilocarpus pinnatifolius - -	Jaborandi - -	„	„
Pimenta officinalis - -	Allspice - -	A.L.C.	1886
„ „ - - -	„ - -	L.M.	1894
Piper Cubeba - - -	Cubeb - - -	„	„
„ longum - - -	Long-pepper -	„	„
„ nigrum - - -	Pepper - -	„	„
„ „ - - -	„ - - -	A.L.C.	1886
Psidium Guayava - -	Guava - -	„	„
Swietenia Mahagoni - -	Mahogany - -	„	„
Tamarindus indicus - -	Tamarind - -	„	„
„ „ - -	„ -	L.M.	1894
Theobroma Cacao - -	Cocoa - -	A.L.C.	1892
„ „ "Alligator" -	„ - - -	L.M.	1894
„ „ "Nicaraguan"	„ - -	„	„
Vanilla grandiflora - -	Vanilla - -	„	„
Xanthochymus pictorius - -	- - - -	A.L.C.	1886
Zingiber officinale - -	Ginger - -	„	„

During the course of last year a prolonged correspondence took place between Kew, the Foreign Office, and Sir Henry Johnston, with a view of ascertaining if some depôt could be established on the east coast from which plants could be supplied to Nyasaland and which would be of more easy access than Zomba. The idea, however, proved impracticable, and Zomba will therefore for the future be treated as the central station to which plants will be sent, where they can be propagated and from which they can be distributed.

The whole position is thoroughly discussed in the following letter from Sir John Kirk :—

Sir John Kirk to Royal Gardens, Kew.

Wavertree, Sevenoaks,
November 30, 1895.

Dear Thiselton-Dyer,

You ask me regarding the establishment of stations for the distribution of useful plants in East Africa. It is obviously a needless expense and waste of means for Kew and other horticultural establishments in England to send out separate consignments to each separate district as hitherto has been done. The work of receiving plants for distribution in East Africa should in my opinion be limited to two central stations, where once received they would be propagated or forwarded at once in part by a skilled gardener who would examine each case on arrival.

The districts to be considered are (1) the British Protectorate of Nyasaland and the British territory south of the Zambesi to be administered by the South Africa Company.

Clearly the best route by which to transmit cases of plants for this region is *viâ* the Cape, as a rule, and Natal with its existing garden is the best centre, being in regular communication by the Cape steamers and possessing a sub-tropical climate where plants likely to succeed in the Nyasa highlands could readily be propagated for distribution.

There is one obstacle that presents itself in the way of this proposal, namely, the rules that are found to be necessary in order to keep the coffee leaf disease out of the Nyasa coffee plantations.

If, therefore, Nyasa will not allow plants that have been propagated at Natal or other points on the coast to be introduced, the administration must make its own provision for the direct transmission of cases and abandon all participation in such a scheme as you suggest. As Nyasaland is in a prosperous state the Administration, aided by the planters, will no doubt prefer to incur the additional cost of direct consignment, in which case there is no necessity to consider the use of Natal as a centre, but if a coast station is to be established to supply that part of our possessions, I feel satisfied that Natal is the proper place from its commercial position and the facility of access and distribution coupled with the warm and moist climate it possesses.

(2.) Between Nyasa and Zanzibar we have no interest, and as at Zanzibar and on the opposite mainland at Mombasa the climate is tropical, a separate station is there needed. Natal would not serve as a centre, partly from the distance, the want of rapid communication and the nature of the climate, that of Natal being sub-tropical and not fitted for many of the plants that might thrive near the equator.

The best point for a central garden to serve the Zanzibar and inland regions would be a little inland from the port of Mombasa, which is a port of regular call by steamships. At a distance of from 10 to 15 miles inland at the foot of the coast hills, or to the south in the Shiruba hills a suitable site with rich soil and abundant water could be found.

The further advantage of such a position is that it would be at the base of a railway line, the construction of which is only a question of a short time if we intend to hold our protectorate in Uganda.

Something might be said for making the station on the island of Zanzibar, where I had my experimental garden, but the climate and soil of the island do not suit many plants that might well be introduced. I would, therefore, prefer a mainland station as near to Mombasa and the railway base of the future as may be.

You are free to make any use you please of the above.

Yours sincerely,
(Signed) JOHN KIRK.

No step has yet been taken to establish a depôt for British East Africa. Meantime, Sir John Kirk's garden still continues to do useful service.

EXTRACT from the GAZETTE for ZANZIBAR and EAST AFRICA, November 27, 1895.

The Rev. Père Mérel only last week, on behalf of the Fathers of the Holy Ghost, took away with him a large quantity of berries for planting at their Mission station of Bura in the Taita district, these being kindly supplied by Miss Thackeray from her specimen plants at Mòweni, planted by Sir John Kirk.

This has brought coffee planting to our doors. We hope from time to time to publish intelligence helpful in these matters.

In a private letter, dated December 15, 1895, Sir John Kirk writes in regard to his Zanzibar garden, which he transferred to Miss Thackeray of the Universities Mission :—"It is a great satisfaction to know that the results have not been thrown away, but are even at this late date beginning to bear fruit. The Germans have long well appreciated the store of fruit trees and flowers, cuttings and seeds of which were to be had, and the tropical species of *Eucalyptus*, such as *E. citriodora*, that I grew are now common from seed obtained from my trees."

DXI.—MYRRH AND BDELLIUM.

Myrrh and frankincense have been precious commodities from the earliest times. Few drugs have had more careful study bestowed on their origin. Yet even to this day it is by no means free from uncertainty.

The preparation of a new edition of the *Official Guide* (*No.* 1) *to the Museums of Economic Botany* in the Royal Gardens has necessitated a re-examination of the subject in view of the fresh observations of Dr. Schweinfurth, of which a brief account is given in the *Pharmaceutical Journal* (April 28, 1894, p. 897).

Flückiger and *Hanbury* (*Pharmacogr.*, 2nd ed., p. 140) state : "It is certain . . . . that the myrrh of commerce is chiefly of African origin."

But numerous other myrrh-like substances are found in Eastern trade which are used as substitutes, and are often intermixed with it. The source of these is partly African, partly Arabian, and partly Indian. But to trace this in each case is a task fraught with extreme difficulty.

AFRICAN MYRRH.

According to Hanbury (*Pharmaceutical Journal*, xii., p. 227), "*Somali* or *African Myrrh* is the so-called *Turkey Myrrh* of commerce."

Of this drug Flückiger and Hanbury (*Pharmacogr.*, 2nd ed., 143), give the following description: "Myrrh consists of irregular roundish masses, varying in size . . . of an opaque reddish brown with dusty dull surface. When broken, they exhibit a rough or waxy fracture, having a moist or unctuous appearance, especially when pressed, and a rich brown hue. The fractured translucent surface often displays characteristic whitish marks, which the ancients compared to the light mark at the base of the finger nails. Myrrh has a peculiar and agreeable fragrance, with an aromatic, bitter and acrid taste."

Somali myrrh is collected "on the range of hills which on the African shore runs parallel to the Somali coast" (*Flück.* and *Hanb.*, *l.c.*, p. 140). The identity of the plant producing it has been carefully studied by Dr. Trimen.

He makes the following statement (*Pharmaceutical Journal*, 3rd ser., ix., p. 893): Hildebrandt "collected in March 1873 in the Ahl Mountains, which run parallel with the North Somali coast" a plant which "was pointed out to him by the natives, who call it *Didin*." He "found myrrh exuded on the stem of the tree, of which the specimen gathered was a branch; it exudes spontaneously, without any external injury, and is called *Molmol* by the Somali, but *Mur* by the Arabs; the former collect it in great quantity, and it is brought to Aden and other Arabian ports, whence it is carried to India and Europe."

This plant Hildebrandt referred without doubt to *Balsamodendron Myrrha*, Nees (*Sitz. Ges. Naturf. Fr.*, Nov. 1878, p. 196).

Dr. Trimen further says: "A large branch sent over in a living state to Kew by Mr. Wykeham Perry appears to be identical with Hildebrandt's . . . It was obtained in Somali-land near the parallel of 47° E. long. Mr. Perry gives the Somali names as *Didthin* for the plant, and *Mulmul* for the product." (*l.c.*) An account of this specimen is given in the *Kew Report* for 1878 (p. 40).

Dr. Trimen had not merely the advantage of discussing the subject with Hildebrandt himself, but he examined and figured (*Bentley* and *Trimen*, *Medicinal Plants*, t. 60) the Somali plant collected by the latter. He further had the opportunity of comparing it with the specimens collected by Ehrenberg on the Arabian coast of the Red Sea (opposite Massowa) on which *Balsamodendron Myrrha* was founded.

So far, then, nothing would seem more secure than the determination of the source of Somali myrrh. Flückiger and Hanbury (*l.c.* 141) conclude: "*Balsamodendron Myrrha*, Nees . . . must therefore be pointed out as the source of true myrrh of the European commerce."

Unfortunately the recent researches of the Berlin botanists have thrown serious doubt on this. It seems clear that the plant collected by Hildebrandt and figured by Trimen is not *B. Myrrha*. On the other hand, it is not, as the Berlin botanists have supposed, *B. Playfairii*, a plant which produces Gum Hotai, a substance entirely different to myrrh. It is apparently closely allied to *Balsamodendron* (Commiphora) *Schimperi*, which must therefore provisionally be accepted as the source of African Myrrh.

Arabian Myrrh.

There appear to be at least two, and probably more, kinds of *Arabian myrrh*.

i. According to Flückiger and Hanbury (*l.c.* p. 143), "Myrrh trees abound on the hills . . . in the territory of the Fadhli tribe . . . lying to the eastward of Aden; myrrh is collected from them by Somalis who cross from the opposite coast for the purpose, and pay a tribute for

the privilege to the Arabs. But a sample of it received . . . from Vaughan in 1852 . . . proved it to be somewhat different from typical myrrh." According to the same authorities (*l.c.* p. 146) both *Somali myrrh* and *Fadhli myrrh* give a violet tint when bromine is added to a petroleum solution.

Hanbury (*Pharmaceutical Journal*, xii. p. 227) thus describes the specimen obtained by Vaughan "produced 40 miles to the eastward of Aden":—"In irregular pieces, varying in size . . . not coated with dust like pieces of *Turkey myrrh*, but having a somewhat shining exterior. Each larger piece appears to be formed by the cohesion of a number of small, rounded, somewhat transparent, externally shining, tears or drops. The fracture much resembles that of common myrrh, but wants the semicircular whitish markings. In odour and taste it closely agrees with true myrrh. Portions of a semi-transparent, brown, papyraceous bark are occasionally attached to pieces of it."

ii. What may be called *Hadramaut myrrh* appears to be distinct from the above. Dymock (*Pharmaceutical Journal*, 3rd ser. vi. 661) says:—"From Makulla and Aden another kind of myrrh is received, the *Arabian myrrh* of the Pharmacographia. The trade name of this drug in Bombay is *meetiga*; it is mostly sold in India as true myrrh, for which it might easily be mistaken . . . I am assured by the dealers that no true myrrh is ever received from Arabia." And the same statement is quoted from Malcolmson by Royle (*Materia Medica*, 2nd ed. p. 384):—"There is no myrrh produced in Arabia."

Parker (*Pharmaceutical Journal*, 3rd. ser., x. p. 81), however, says:—"The '*meetiga*' of the Bombay market, called Arabian myrrh by Dymock, differs entirely from . . . Hanbury's *Arabian myrrh*." But Flückiger and Hanbury only recognise under the name Nos. i. and iii.

iii. Flückiger and Hanbury (*l.c.* p. 146) describe what is apparently a third kind of Arabian myrrh. "This is the myrrh '*Hodaidia Jebeli*,' from north and north-western Yemen." It gives no colour with bromine.

The source of these kinds of myrrh is still involved in more or less uncertainty. *Balsamodendron Myrrha* was originally described from Ehrenberg's Arabian specimens. It is doubtful if it affords any part of the Arabian myrrh of commerce. This conclusion is confirmed by Deflers, *Voyage au Yemen* (p. 120).

"Le myrrhe,—el-Mour des Arabes,—est, après le café, un des principaux articles de commerce du Yemen. Mais elle y est importée en grande partie du Harrar et des pays Sômalis qui sont les véritables centres de production de cette résine aromatique. Bien que l'arbre à myrrhe (probablement le *B. Myrrha*) soit commun dans toute la région montagneuse moyenne et inférieure du Yemen, il est trop disséminé dans les localités que j'ai visitées pour être l'objet d'une exploitation rémunératrice."

Balsamodendron Opobalsamum, Kth. (B. ehrenbergianum, *Berg.*) appears to be widely distributed throughout the Arabian littoral. It has been repeatedly collected in the neighbourhood of Aden. Deflers refers to this species, though with hesitation, the plant from which myrrh is collected in Northern Yemen. He remarks that it had neither flower nor fruit and seemed to belong to a form intermediate between *B. Myrrha* and *B. Opobalsamum*. He gives the following account of the collection of myrrh from it (*l.c.* p. 121).

"La myrrhe en larmes, concrété à la surface des fragments d'écorce pris sur les *Balsamodendron* des environs de Hodjeilah m'a paru abondante et comparable aux variétés les plus estimées. Déjà, sur les

contreforts du gebel Hofasch, au N. du wadi Surdûd, on commence à pratiquer l'extraction de la myrrhe. Mais c'est principalement dans le district de Sûda, à environ 90 kilom. au N.N.E. de San'â, que cette industrie est exercée en grand. Le procédé d'extraction est forte simple. Il consiste en incisions longitudinales pratiquées dans l'écorce. La myrrhe est recueillie dans des tasses (findjân) disposées au bas des incisions."

The most recent research on the subject is that of Schweinfurth already referred to. He has been so kind as to furnish the following abstract of his results. It must be premised that *Balsamodendron*, *Hemprichia*, and *Commiphora* are all names for the same genus.

Résultats de mes recherches sur le Baume et la Myrrhe.

A.—*À l'égard des recherches bibliques :—*

Le mot hébraïque "*môr*" n'est pas à traduire avec myrrhe, mais par "baume."

"*Môr*" est toujours cité dans le sens d'un liquide aromatique, tandisque que la myrrhe est un corps solide, pas ou presque pas aromatique, mais à l'émploi de la médecine, plutôt d'une odeur désagréable.

Tous les passages de l'ancien testament ne mentionnent ce "*môr*" que dans le sens indiqué (Cantiques 3, 6 ; 5, 1 ; 5, 5 ; 5, 13 ; Moïse II., 30, 23 ; Psaumes 45, 9 ; Proverbes Salom. 7, 17).

Les LXX (juifs précisés) en traduisant le texte hébreux en grec, n'ont plus connu, à l'époque où ils vivaient, la vraie signification du "*môr*," mot qu'ils ont par ressemblance du son confondu avec le mot arabe *morr*, que veut dire "myrrhe."

Les traducteurs allemands récents de Hallé de l'ancien testament qui ont collaboré à l'édition de Hallé 1894 de Prof. Kautsch ont adhéré à l'opinion que je viens de prononcer. Le Prof. Kautsch m'a promis de changer tous les passages (cités ci-devant) de l'ancien testament d'après mes constatations.

L'arbre de baume est appelé en Arabic *bechâm* (anglais *beshâm*). Ce nom est connu aussi de Ibn-el-Baitar.

Le produit de baume est appelé *balessân*, d'où les Grecs on tiré leur βάλσαμον. En hébreux (voir Cantiques 5, 1 ; "mori-im-besâmi") bechâm se prononcait bĕsĕm ou basām.

B.—*À l'égard de la nomenclature botanique.*

Baume est le suc de *Commiphora Opobalsamum*.

La myrrhe est la résine de *Commiphora abyssinica*, et très-probablement aussi de *C. Schimperi*.

Nees de Esenbeck a commis l'erreur de substituer à la Myrrhe une autre espèce le *Hemprichia* (Commiphora) *Myrrha*, (Nees) Schwf., parcequ'il avait mal copié une note dans l'herbier d'Ehrenberg qui indiquait pour cette plante : "fortasse etiam Myrrham præbens, sed non satis constat." Malgré cette note la plante fut proclamé dans les Düsseldorfer Arzneigewächse, tab. 357, comme le prototype de la myrrhe.

Il faut cependant conserver par droit d'ancienneté le mot mal appliqué de Nees *Hemiprichia Myrrha*. Cette plante que le compagnon d'Ehrenberg, le Dr. Hemprich avait cueilli en 1825 près de Lahaja, appartient au Tehama, la région littorale du Yemen, tandis que la vraie Myrrhe ne pousse que dans les montagnes, soit de l'Arabie soit de l'Abyssinie. Le *H. Myrrha*, Schwf., est complètement inodore et ne produit aucune résine.

MM. Engler, Schumann, Garcke, &c., ont adopté dans leur édition l'explication donnée par moi. La myrrhe des Somal n'est pas encore suffisamment constaté, personne n'a vu la recueillir, sauf Hildebrandt qui a manqué d'identifier l'espèce botaniquement. Chez les Somal plusieurs espèces de *Commiphora* sont en jeu.

L'identité de *Commiphora abyssinica* avec la myrrhe du commerce d'Arabie a été constaté par M. A. Deflers en 1893 dans le pays des Fadhli (est d'Aden) ou il a vu collectionner la myrrhe et d'oú il a rapporté des échantillons botaniques. D'après Deflers aussi la region à l'ouest d'Aden, au centre de l'angle sud-ouest qui forme la peninsule d'Arabie, en contient beaucoup. Cette espèce de myrrhe est aussi beaucoup exploité dans le district de Suda dans le Yemen turc (90 kilomètres à nord-ouest de Sana). Ce dernier donne la myrrhe du commerce exporté par Hadeidah comme la meilleure.

La myrrhe n'est pas recueillie en Abyssinie du moins pas pour le commerce.

En Arabie on appelle la myrrhe aujourd'hui "*Khaddash*" pour le produit, "murr" ou "morr" serait plutot l'expression arabe littéraire.

La myrrhe des anciens était un medicament solide; une seule variété, qu'on appelait "*stakte*" pouvait servir comme ingrédient aromatique à la composition des mixtures odorantes.

The deliberate judgment of so accomplished a botanist as Dr. Schweinfurth is entitled to great weight. It will be observed that he expresses no opinion as to the origin of *Somali myrrh*, although he sets aside the conclusions which have hitherto been drawn by Flückiger, Hanbury, Trimen and others from Hildebrandt's observations The conclusions at which Schweinfurth arrives are apparently: (i.) that *Fahdli* and *Yemen Myrrh* are identical; (ii.) that both are produced by *Balsamodendron abyssinicum* with which Deflers appears to have recently identified the plant which he formerly doubtfully referred to *B. Opobalsamum.*

I must confess that both conclusions seem to me to present some difficulty. In the first place both Somali and Fadhli myrrh give the same colour reaction with bromine, while Yemen myrrh gives none. Yet Hanbury (*Pharm. Journ.* xii., p. 227) thought Fadhli myrrh "the produce of some other tree than that producing common myrrh," *i.e.*, that the plants producing Somali and Fahdli myrrh were different, as is probably the case. On the other hand, the Kew Herbarium contains a specimen from the neighbourhood of Aden collected by Captain Hunter and labelled by him "true myrrh," which agrees with *B. Myrrha.* In the *Kew Report* for 1878 (p. 40) the following account is given of a specimen sent to Kew by Mr. Wykeham Perry "as the true myrrh tree of Arabia." "It came from the hills in the Fadhli district, some 60 miles from Aden. It was believed to be the same species as the Somali plant. This may be so, but it is wanting in the excessive spininess of *B. Myrrha*, and a small flowering branch previously received from Mr. Wykeham Perry appeared to agree with *B. Opobalsamum*, Kth., found in Abyssinia by Schweinfurth, and which is believed to be identical with *B. ehrenbergianum*, Berg." Trimen (*Bentley and Trimen, Medicinal Plants*, sub tab. 60) on the other hand regards the specimen as belonging to "apparently the same species" as *B. Myrrha.* It seems probable that Wykeham Perry's plant is the same as the intermediate form of Deflers referred to above, and I am now disposed to identify it with *Commiphora simplicifolia*, Schw.

The Kew Herbarium contains a suite of specimens of this species, collected in Arabia Felix by Schweinfurth himself. Two of these bear the vernacular name "*Chaddasch*" or "*Chaddesch*." I presume that this is the plant identified as *B. abyssinicum* by Deflers. The identity of Schweinfurth's with the Abyssinian plant is not obvious, and it may conveniently be maintained as a distinct species. Schweinfurth remarks that myrrh is not collected from *B. abyssinicum* in Abyssinia, and the only evidence that I have seen that it yields any product of the sort is the label of a specimen collected by Speke and Grant, which bears the remark "Frankincense shrub, fencing by gardens."

A specimen of a plant stated to yield myrrh collected by Captain Hunter in the neighbourhood of Aden seems to me also identical with Schweinfurth's. The evidence appears to point to the conclusion that in the Fadhli district myrrh may be yielded by both *Balsamodendron Myrrha* and *B. simplicifolium*, while the latter may be accepted as the source of *Yemen myrrh*.

As to *Hadramaut myrrh*, we have the evidence of the specimens collected in 1893–4 by Mr. Theodore Bent, who was asked to give particular attention to the subject. It can hardly be doubted that they are referable to *B. Opobalsamum* (*Kew Bulletin*, 1894, p. 330).

African Bdellium.

This drug, which is associated with myrrh, but, as far as East Africa is concerned, seems little known in European commerce, is exported to Bombay from Berbera, a small seaport in Eastern Africa, viâ Aden. It appears to have been generally identified with the drug to which Guibourt originally gave the name, and which was derived from West Africa.

Royle (*Mat. Med.*, 2nd ed., 387) says:—*Balsamodendron africanum*, Arnott "found in the west of Africa, occurs also in Abyssinia, having been found in the flat country of the Adel. It yields African bdellium, or that imported into France from Guinea and Senegal, according to M. Perottet. M. Adanson, likewise, in his travels in the Senegal, mentions it by the name of *Niotout*, as producing bdellium."

Guibourt (*Hist. Nat. des drogues simples*, 4e ed. iii., 472) says that "il en vient aussi d'Arabie qui parait être de même nature." With regard to *Balsamodendron africanum*, the plant producing it, he adds "il est probable qu'il traverse l'Afrique de part en part, et rien n'empêche de penser qu'il ne croisse également en Arabie."

Dymock (*Pharmacogr. Ind.* i., p. 310) says:—"to a certain extent resembles myrrh, but is of a darker colour, less oily, and has a peculiar odour destitute of the aroma of myrrh;" and further "common bdellium is strongly bitter and has hardly any aroma."

The most detailed description is, however, given by Parker (*Pharm. Journ.*, 3rd ser. x., p. 82):—"*African Bdellium* is met with in large tears like *Opaque Bdellium*, but the granulation is less coarse, and the surface is traversed by deep cracks. It is very hard; the conchoidal fracture appears slightly opaque, of a dull bluish stony hue, with a characteristic resinous margin; it is reddish and *translucent* in thin layers, almost odourless, and its taste feebly bitter."

Dymock (*l. c* p. 310) includes both this and *Habak-hadee*, a drug to be described further on, under the general name of "*Bysa-bol*." This is, however, used by all other writers in a more restricted sense.

The following passage in Royle's Materia Medica (pp. 386–7) seems to have been overlooked by later writers.

"Mr. Johnston, also in his travels through Adel to Abyssinia (i. p. 247), in treating 'of the tree that yields this useful drug, myrrh,' says 'there are in the country of Adel two varieties, one a low, thorny, ragged looking tree, with bright green leaves, trifoliate, and an undulating edge, is that which has been described by Ehrenberg. This produces the finest kind of myrrh in our shops.' This may be either *B. Myrrha* or one of the forms of *B. Opobalsamum*. 'The other is a more leafy tree, if I may use the expression, and its appearance reminded me exceedingly of the common hawthorn of home, having the same largely serrated, dark green leaves, growing in bunches of four or five, springing by several leaf-stalks from a common centre. The flowers are small, of a light green colour, hanging in pairs beneath the leaves, and in size and shape resemble very much the flowers of our gooseberry tree. . . . . The fruit is a kind of berry, that when ripe easily throws off the dry shell in two pieces, and the two seeds it contains escape. The outer bark is thin, transparent, and easily detached; the inner, thick, woody. When wounded, a yellow turbid fluid (the gum-myrrh) immediately makes its appearance. Naturally, the gum exudes from cracks in the bark of the trunk near the root, and flows freely upon the stones immediately underneath. Artificially it is obtained by bruises made with stones.'

"This plant, judging from the specimens deposited by Mr. Johnston in the British Museum, corresponds exactly with one, also in the same collection, obtained by Mr. Salt in Abyssinia, *Balsamodendron Kua* of Mr. Brown's MSS., and of which Mr. Salt says, he obtained from it a gum much resembling the myrrh."

I am indebted to Mr. George Murray, the keeper of the Botanical Department of the British Museum, for tracings both of Mr. Salt's drawing and of Mr. Johnston's specimen. Both appear to me referable to *B. abyssinicum*, which Oliver refers as a variety to *B. africanum*. Royle states (*l.c.*, p. 387, footnote):—"Mr. Johnston immediately recognised it [*i.e. B. africanum*] as one of the trees yielding gum resin. The leaflets are like those of *B. Kua*, Br." It appears therefore that of the two plants met with by Mr. Johnston, the first is the source of "true myrrh," the second of African bdellium.

Opaque Bdellium.

Parker (*Pharmaceutical Journal*, 3rd. ser. x., p. 82) gives the following description of this drug:—"may be at once recognised by its *opaque*, yellow-ochre coloured, conchoidal fracture; it resists the nail. It is very hard and difficult to fracture (difference from "gum hotai"), almost odourless and its taste bitter without acidity, occurs frequently in large elliptical tears with a coarsely granular surface."

Like African bdellium, it finds its way to India from Berbera.

According to Dymock (*Pharmaceutical Journal*, 3rd ser., vi., p. 661) this is found in the bales of African myrrh when sorted at Bombay. It "is called *meena harma*, and is used for the extraction of Guinea worm; it is of a yellowish-white colour, resembling ammoniacum, with hardly any odour, and a bitter taste."

Parker however (*l.c.*, p. 82), remarks that "Dymock's specimen . . . of *Opaque Bdellium*, is *a very brittle* opaque gum, which agrees chemically with the gum *hotai* of Vaughan. Dymock's identification would seem therefore to be incorrect. Perhaps Parker's statement was

not clearly understood by Bentley and Trimen who (*Medicinal Plants*, sub tab. 60), referring to *Hotai*, observe "for which *Opaque Bdellium* is another name."

Parker (*Pharmaceutical Journal*, 3rd ser. xi., p. 41), further points out that tincture of *Opaque Bdellium* gives an intense greenish-black colour with ferric chloride, while tincture of *gum hotai* does not.

Of the source of *Opaque Bdellium* nothing appears to be known. Parker (*l.c.* p. 82) attributes it to *Balsamodendron Playfairii*, supposed to be the source of *Gum Hotai*, but there appears to be no ground for this except Bentley and Trimen's mistaken identification of the two drugs.

Bissa Bôl.

Hanbury states (*Pharmaceutical Journal*, xii., p. 227) that this is "usually regarded as a species of myrrh of inferior quality. It was formerly known as *East Indian Myrrh*, but is now seldom so distinguished . . . . It is quite distinct from *Indian* and *African Bdellium*."

Flückiger and Hanbury (*Pharmacographia*, 2nd ed., p. 146.) says:— "*Bissa Bôl* differs from myrrh in its stronger almost acrid taste, and in odour which when once familiar is easily recognisable; fine specimens of the former have the outward character of myrrh, and perhaps are often passed off for it." But they state that, unlike myrrh, it gives no violet colour with bromine.

They identify it with *Habaghadi* or *Hebbakhade* of the Somalis.

It is exported from the whole Somali coast. (*Flück. and Hanb. Pharmacographia*, 2nd ed., p. 145.) According to Captain Hunter (quoted by the same authors, *l.c.*, pp. 140, 141) it is not found "in the coast range of the Somali country, but only at a considerable distance from the sea-shore."

He gives the following description of it: "occurs in irregular-shaped pieces more or less flat, some of them having earth and fragments of bark adhering; it is of a dark reddish-brown colour, but opaque reddish-white streaks run through the semi-transparent reddish mass. The odour is more powerful and more perfumed than that of bdellium; the taste perfumed, aromatic, and feebly bitter."

Dymock (*Pharmaceutical Journal*, 3rd ser. vi. p. 661) further says that the adherent bark is thick, "not the birch-like bark that adheres to common bdellium . . . The odour on fresh fracture is powerful and pleasant, not unlike a lemon lollipop."

Parker (*Pharmaceutical Journal*, 3rd ser. x., p. 82) identifies Dymock's *perfumed Bdellium* with *Bissa bôl* proper. He states that "bales of *Bissa bôl* are shipped from Berbera to Bombay; probably a large proportion of it goes to China."

He describes it as resembling "myrrh much more closely than either of the bdelliums previously described. In external appearance it is very similar, the fracture is waxy, yields to the nail, giving an oily exudation like 'soft myrrh'; yellowish-white markings also appear, which however differ essentially from those of myrrh in being traversed by angular interstices filled with transparent reddish-brown resin (or gum resin). It may be readily distinguished by its powerful aromatic odour, totally unlike myrrh, difficult to describe (perhaps because nothing resembles it), but easily recognised after one introduction to the olfactory nerve. . . . . The taste is aromatic and slightly bitter."

In the *Kew Reports* for 1878 (p. 41) and 1880 (pp. 50, 51) reference is made to specimens of the plants yielding Bêsabol brought to this country by Mr. Wykeham Perry. They produced foliage at Kew and were identified as *Hemprichia erythræa*, Ehr. *Hemprichia* is now known to be identical with *Balsamodendron*, and the species producing *Bissà bôl* may therefore be regarded as *B. erythræum*. Parker (*l.c.*) gives it as *B. Kafal*. This is apparently founded upon the remark of Bentley and Trimen (*Medicinal Plants*, sub tab. 60) that *Hemprichia erythræa* is probably to be referred to *Amyris Kafal* of Forskål. In this Engler (*De Cand. Monogr.* iv. p. 21) agrees.

Trimen (*l.c.*) also suggests the further identity of *Balsamodendron Kataf*; but in this Engler (*l.c.*, p. 19) does not concur.

Mr. E. M. Holmes made the following statement (Pharm. Journ., 3rd Ser., XXV., 1894–95, p. 501) :—

"With regard to the perfume called opopanax, I find that the oil of opopanax of perfumery is obtained from a gum-resin which has a totally different origin, being derived from *Commiphora Kataf*, Engl. It is the "Bissabol" of Pharmacographia (2nd Ed., p. 145), and the perfumed bdellium of Dymock, Mat. Med. India, pp. 158–9. In appearance it resembles opopanax and myrrh also, but it has a slightly pleasant and quite distinctive odour."

It is pointed out in the *Kew Report* for 1878 (p. 41) that :—"Forskal relates that the gum of *Balsamodendron Kataf* is used by Arab women for washing their hair, which is precisely the purpose for which that next to be mentioned [*Gum Hotai*] is employed in Somali-land."

Hotai.

According to Vaughan (*Pharm. Journ.* xii., p. 227) this "is the name of a gum produced by a small thorny tree which grows in the Somali country about Bunder Murayeh. The tree or shrub is in appearance not unlike that which produces the myrrh, and attains the height of about six feet."

Flückiger and Hanbury (*Pharmacogr.* 2nd. ed., p. 146) quote Miles for the statement that "*hodthai* is only used in the Somali country, by men to whiten their shields (by means of an emulsion made with the drug), by women to cleanse their hair." They further suggest that "probably *hodthai* and *habaghadi* is one and the same thing." In the *Kew Report* for 1880, p. 51, it is pointed out that "the gums themselves are certainly distinct, and . . . . . the plants yielding them also."

The origin of *Hotai* seemed clearly established by the specimens sent to Kew by Sir Lambert Playfair which Sir Joseph Hooker described as *Balsamodendron Playfairii*. To these is attached in the Kew Herbarium a note by Hanbury :—"It constitutes a spiny shrub of 6 feet high growing in great abundance all along the Somali coast on the sandy plain lying between the mountains and the sea. Its Arabic name *Hotai* is also applied to the gum which it appears to produce in abundance and of which Captain Playfair has sent us specimens. This gum is an opaque, whitish, brittle substance, occurring in large tears; it is nearly inodorous but has bitterish acrid taste; with water it readily forms a frothing emulsion. The gum is collected by the Somalis, who use it as soap, and according to Mr. Vaughan especially for cleansing the hair."

Hanbury (*Pharm. Journ.*, xii., pp. 227, 228) describes Hotai (from Vaughan's specimens) as occurring in "irregular pieces . . . .

of wax-like opacity, cracked in all directions, and readily breaking up into angular pieces; on the exterior the larger pieces are yellowish-brown or somewhat liver-coloured, and occasionally encrusted on one side with a reddish sand . . . internally paler or nearly white, sometimes darker towards the centre. . . . . Nearly inodorous, but in taste is slightly bitter and acrid to the throat . . . . . agitated with water in a phial speedily affords an emulsion, which remains frothy and milky for many days."

Engler (*De Cand. Monogr.* iv., p. 11), has identified *B. Playfairii* with *B. Myrrha*, but this identification cannot be sustained.

Playfair's specimens bear the label "Somali country. The plant yielding the gum 'Hotai.'" This Engler quotes as "Somali, in campis Hotai," a translation which might, perhaps, mislead. It is, however, to be noted that the myrrh plant grows on the mountains parallel to the Somali coast, while Playfair's plant grew on the sandy plain between the mountains and the sea.

Engler (*Natürl. Pflanzenfam.* iii. 4, p. 256) quotes the statement of Hildebrandt which has been cited above as to the plant from which the latter collected myrrh in Somali-land. But he adds the qualification not given by Trimen that it was a plant "much resembling *B. Myrrha*, which has been described as a distinct species, *B. Playfairii*. This is, however, an error; as shown above, it is different from both.

Casual Ingredients.

African myrrh when sorted at Bombay is found to contain a variety of other substances more or less similar in character. About these little or nothing is known. They are discussed by Parker (*Pharm. Journ.*, 3rd ser. x., p. 82, and xi., pp. 41–43).

Indian Bdellium.

Two kinds are described by Dymock (*Pharmacogr. Ind.* i. pp. 310–311).

i. The produce of *Balsamodendron Mukul* somewhat resembles the African drug in general appearance, the pieces often having portions of papery bark attached to them, but the colour is lighter, often greenish; the odour and taste are somewhat different, and a certain proportion of it is in distinct vermiform pieces as thick as the little finger. Its value is one-third less than that of African bdellium.

ii. The produce of *B. Roxburghii* occurs in irregular lumps covered more or less with dirt and hair, to which portions of papery bark as well as the thick inner bark sometimes adhere; it is of a greenish-yellow colour, with an occasional tinge of red; consistence waxy, soft and brittle; odour peculiar and balsamic, something like cedar wood; taste bitter; with water it forms a greyish-white emulsion.

It seems not impossible that these are the same thing, and produced by the same species, *B Mukul*. Stocks erroneously identified *B. Mukul* with *B. Roxburghii*, which is an eastern and not a western species in India (*see* Hooker, *Kew Journ. Bot.*, i., p. 259).

DXII.—MISCELLANEOUS NOTES.

Mr. Robert Derry, formerly in the employ of the Royal Gardens, and late Assistant Superintendent of the Gardens and Forest Department, Malacca, a post recently abolished, has been appointed Superintendent of Gardens, Perak.

Mr. Alfred Parsons, Superintendent of the Annandale Gardens, Simla, Punjab, has resigned his appointment on the reduction of the salary. The post has ceased to be filled by an officer possessed of technical knowledge.

Mr. Charles Wakely has been appointed Staff Instructor in Horticulture under the Technical Instruction Committee of the Essex County Council. He was for five years in the employ of the Royal Gardens, during two and a half years of which he was sub-foreman in the tropical propagating department.

Mr. William Binder, late foreman in the Temperate House Department of the Royal Gardens, died at Kew on January 12 last after a prolonged illness. His service extended from 1871 to 1887, when he was retired on account of old age. The Superannuation Act of 1887 abolished pensions for men in Mr. Binder's position, and on his retirement he only received a small gratuity. His case was, however, taken up by the Gardeners' Benevolent Institution, from which Mr. Binder received an annual allowance until his death.

The Botanical Magazine for February.—*Begonia umbraculifera*, a native of Brazil, is a robust species, remarkable for having hermaphrodite and unisexual flowers intermixed. Kew obtained a plant from Messrs. Sander and Co., who imported it with orchids. "*Scutellaria formosana*" is a pretty, half-shrubby species having dark purple flowers. It was sent to Kew by Mr. Ford, the Superintendent of the Botanic and Afforestation Department of Hong Kong, with the information that it was from the island of Hainan. But the plant figured is not the true *S. formosana*, N.E. Br. but *S. javanica*, Jungh., though it is probable that the former, *S. javanica*, and *S. sumatrana* are varieties of one species. *Sternbergia macrantha* is a handsome species received from Mr. E. J. Whittall, of Smyrna. *Hechtia argentea* (Bromeliaceæ) was drawn from a plant that has been in the collection for at least a quarter of a century. It is the most attractive of this striking but not very showy genus. *Bifrenaria tyrianthina*, a fine Brazilian species, is an even older inhabitant of our gardens, having been introduced by the firm of Loddiges 60 years ago. The plant figured was obtained from Messrs. Linden, of Ghent, in 1893.

Relief House.—One of the great difficulties in maintaining a collection of plants under glass is the necessity from time to time of repairing and

repainting the houses in which they are grown. For this purpose the houses have to be emptied and the plants removed. They inevitably suffer severely from being crowded and stowed away in places quite unsuitable to their cultivation.

To remedy this difficulty, H.M. Office of Works built last year in one of the private cultural departments of the establishment ('Melon Yard') a "relief house." This structure is 56 ft. long, 23 ft. wide, and 13 ft. 7 in. in height at the ridge. It is constructed of iron, and in order to admit as much light as possible, copper glazing by Messrs. Rendle was adopted for the lights. Any collection can now be transferred at short notice to the "relief house" where it will be, though not accessible to the public, safe from injury till its original quarters are again available for occupation.

Palm House Heating.—During the past year the renewal of the heating apparatus in the Palm House has been completed. In the *Kew Bulletin* (pp. 42, 43) for February 1895 an account was given of the work done on the north wing in 1894 at a cost of 1,000*l.* During the past summer the south wing has been dealt with in the same way.

It is now becoming generally understood that the heating of large structures for horticultural purposes requires a different treatment to that which is suitable in other cases. It is necessary to have a large amount of piping heated to a comparatively low temperature rather than a small amount at a much higher. At first sight this looks wasteful, but in practice it does not prove to be so. The improvement of the heating arrangements in the Palm House have resulted in a considerable economy of fuel, though there are more pipes to heat. An insufficient amount of pipes necessitates the furnaces being "driven," with a consequent waste of fuel. The atmosphere in the house is heated by the continuous movement of the hot air in contact with the pipes, which in turn is replaced by cooler ("convection"). The hotter the pipes, the more violent are the currents and draughts set up. The heated air absorbs the moisture too rapidly, to deposit it as "drip" on the cold surface of the glass. In cold weather it is almost impossible to maintain the humidity necessary for the welfare of the plants. These, especially when tropical, suffer almost more from excessive dryness than from a low temperature.

As the heated air ascends from the pipes below it cools, and a down draught is set up. The use of a high level auxiliary pipe to a large extent remedies this. Piping is now carried round the whole of the Palm-House at the level of the lantern.

Douglas Spruce Spar.—The great flagstaff in the Arboretum at Kew is one of the most conspicuous landmarks of the neighbourhood. It is the second of two spars which were presented to the Royal Gardens with great public spirit by Edward Stamp, Esq., of the firm of Messrs. Anderson, Anderson, and Co. The first was from British Columbia, and was 118 feet in length. It was broken in course of erection in 1859. The existing spar came from Vancouver's Island, and is 159 feet in length. It was erected in 1861, and is believed to be the tallest spar in the old world. The age of the tree from which it was cut was about 250 years, and its total height 180 feet. The base had gradually become decayed, and on examination it was pronounced by the Admiralty to be unsafe. Messrs. Anderson, Anderson, and Co. were,

however, of opinion that it might still be preserved, and on their recommendation the work was placed by H.M. Office of Works in the hands of Messrs. Robinson and Dodd, contractors to H.M. Indian Government, of Bridge Road Works, Poplar. They successfully lowered it, removed the decayed base, and spliced on a new one of pitch-pine. The splice is held together by five iron bands. The spar was then re-erected on February 4 last.

Pelican.—During the month of January the fine Dalmatian pelican (*Pelicanus crispus*), which had for many years been a popular pet in the Royal Gardens, met with some unexplained accident, and broke both its wings. The injury was, unfortunately, not discovered till it was past remedy, and the bird had to be killed to put it out of suffering. It was given to the Royal Gardens in 1888 by Lord Lilford, who had obtained it from the Lower Danube.

The Zoological Society has, with great kindness (through the secretary, P. Sclater, Esq., F.R.S.), supplied its place with a female white pelican (*Pelicanus onocrotalus*), which it is hoped will mate with the surviving bird of the same species.

Blackthorn fishhooks.—Amongst recent additions to the Museums is one illustrating a singular application of the blackthorn (*Prunus spinosa*). It seems that the spines or thorns of this well-known plant are not uncommonly used on the east coast of Essex as fishhooks. We are indebted to Mr. R. T. Pritchett, a resident of Kew, for a portion of a fishing line that has apparently seen considerable service on the Essex coast, and to which these thorns with a small portion of the twig attached are fixed by a peculiar knot to the short lines. In the volume on "Sea Fishing," forming one of the Badminton Library series, these singular hooks are illustrated, and are thus referred to:—"In the Thames estuary, on the coast of Essex, thorn hooks are still used. The form of these curious contrivances, which we should expect to find among aborigines rather than in English waters, will be understood from the illustration. Each thorn has about an inch of lugworm twisted round it, and the lines so baited are laid about 50 yards from the shore at low tide." In addition to the actual specimen Mr. Pritchett has been good enough to furnish a drawing of the hook showing the attachment to the line, and he further tells us that similar hooks were, a few years since, used on the coast of Merioneth.

Strobilanthes callosus.—This is an acanthaceous plant confined to western and central India which has not hitherto had any economic properties attributed to it, nor does its distinct patchouli odour seem to have been recorded. The following correspondence gives the particulars:—

MR. F. C. CONSTABLE TO ROYAL GARDENS, KEW.

DEAR SIR, Rhandalla, January 3, 1896.

I SEND you a box of the apparently unopened buds of a shrub or small tree. I send them for this reason: I was walking on a steep mountain side through half a mile or more of these trees close together

simply laden with the buds. There was in the air a sweet, resinous, pleasant odour from the buds. My hands were covered with what they exuded and—this is the point—though I washed my hands three times the pleasant scent remained.

Can the buds be put to any use? I am here but for ten days, but from what I have seen should think there must be an almost inexhaustible supply.

Yours faithfully,
(Signed) F. C. Constable.
Karachi, Sind.

Messrs. Piesse & Lubin to Royal Gardens, Kew.

2, New Bond Street, London,
Dear Mr. Jackson, February 4, 1896.

Your note and the sample of Strobilanthes duly to hand this morning.

The odour certainly somewhat resembles patchouli, but, we think here, not so good.

If your correspondent could have some of the cones and leaves distilled with water so as to collect the otto we could form a better opinion as to its applicability to the wants of the perfumery trade. Speaking generally, we think it would be likely to be used in the soap trade. Some ottos, as you know, are considerably altered by the distillation, for example neroli, from orange blossom, and the neroli is perhaps more appreciated than the orange blossom, if we may judge from the everlasting demand for "eau de cologne" in which it is prominent. The experiment is worth trying, and perhaps your correspondent would pick up some hints from the "Art of Perfumery."

Believe me, &c.,
(Signed) Charles H. Piesse.

Mr. Littledale's Tibetan Plants.—Mr. Littledale gave a striking account of his recent remarkable journey in Tibet at the meeting of the Royal Geographical Society on February 24.

The Director made the following remarks on the plants collected :—

"It was a happy circumstance that Mr. Littledale had been able to save his parcel of dried plants from the disasters which befel the rest of his collections. Its examination, which is not yet wholly completed, proved extremely interesting. It contained between 60 and 70 species, of which probably ten are new to science. They were nearly all found in a [Gooring] valley (about 16,000 feet) on the south side of the high range of mountains which lie between the Tengri Nor and Lhasa. The precise position was lat. 30° 12′, N. and long. 90° 25′, E.

"One of the most striking features of the collection is the large preponderance of European genera; one might in fact say of British, because the large majority are represented in Britain. Out of betwen 40 and 50 genera there are only half a dozen of which this is not the case. Five species, *Aconitum Napellus*, *Potentilla fruticosa*, *Myriophyllum verticillatum* *Taraxacum palustre* and *Polygonum viviparum* are actually found in this country. The first is probably an introduced plant, the *Myriophyllum* is an aquatic, the distribution of which is usually wide, but the two last are characteristic mountain forms with us. And

in *Potentilla fruticosa* we have the most striking link between the two floras, as, though a rare plant, it is undoubtedly native in the North of England and the West of Ireland.

"The flora of Western Tibet has long been tolerably well known. Eastern Tibet on the other hand was stated by Sir Joseph Hooker in 1855 to be 'quite unknown botanically.' Since this time our knowledge of the northern belt is the result of the journies of Prjevalsky and Potanin, of Captain Bower, and of Mr. Rockhill. The publication of the collections of the two former travellers was interrupted by the lamented death of Maximowicz. Those of the two latter were worked out at Kew, and the results are published in the *Journ. Linn. Soc.* (vol. xxx., pp. 131–140). Of the flora of the country between the neighbourhood of the Tengri Nor and Sikkim our knowledge is still extremely limited, and is much enlarged by Mr. Littledale's work. Sir Joseph Hooker in two days' journey only succeeded in collecting some 15 to 20 species. In 1882 the Royal Botanic Gardens, Calcutta, obtained some plants through a native collector, Ugyen Gyatsho, who accompanied Sarat Chandra Das in his journey to Lhasa; the collector did not, however, get further east than Gyatse Jong. In 1890, Prince Henri d'Orleans, like Mr. Littledale, attempted to reach Lhasa from the north, but apparently collected no plants in this part of his journey.

"The conditions under which the Tibetan flora exists are perhaps unique. Long ago General Strachey expressed his conviction that flowering plants existed up to 19,000 ft. (J.R.G.S. xxi., p. 77). But 18,000 ft. appears to have been the highest observed level till the receipt of the collections of Surgeon-Captain Thorold who accompanied Captain Bower. The conditions under which vegetation can exist in such circumstances are of course extreme. It is hardly necessary to say that there are no trees and no shrubs nor any plants above a foot high. Very few indeed are above 3 inches out of the ground. General Strachey estimated that in the part of Western Tibet which he visited 'not one twentieth part of the surface was covered with vegetation' (*Journ. Linn. Soc.* xxx, p. 101). A very large proportion of the plants are herbaceous perennials with long tap-roots, a rosette of leaves lying on the ground, from the centre of which springs the dwarf inflorescence.

"The flora as a whole belongs to the Arctic-alpine division of the great northern region. But as usual this contains a purely endemic element, and also one related to the neighbouring area to the south, from which it has been perhaps recruited. Of the characteristically Tibetan plants obtained by Mr. Littledale some had been previously obtained by Prjevalsky, Thorold, and Rockhill. Of the species not exclusively Tibetan, some extend to the Himalayas and the mountains of Western China.

"Of the typical Arctic-alpine flora two species may be singled out as representative. *Lychnis apetala* extends to Spitzbergen, and there is a very interesting form of the well-known edelweiss, *Leontopodium alpinum*, which was also collected by Mr. Rockhill. The total absence of gentians in Mr. Littledale's collection is remarkable. It is interesting to note that the single fern collected, *Polypodium hastatum*, was previously only known from Eastern Asia (China, Japan, and Corea). Among the new species is a striking grass. Of two fungi collected, one is new."